RESEARCH AND SCIENCE IN ALBERTA 1983-84

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SYMBOLS

..	figures not available
--	nil or amount too small to be expressed
e	estimates
r	revised figures

NOTES

1. Totals may not be the sums of component parts due to rounding.

2. Figures cited for 1982-83 may reflect revision of previously published estimates.

3. The abbreviated form "social science" may be used to refer to both the social sciences and humanities.

ABSTRACT

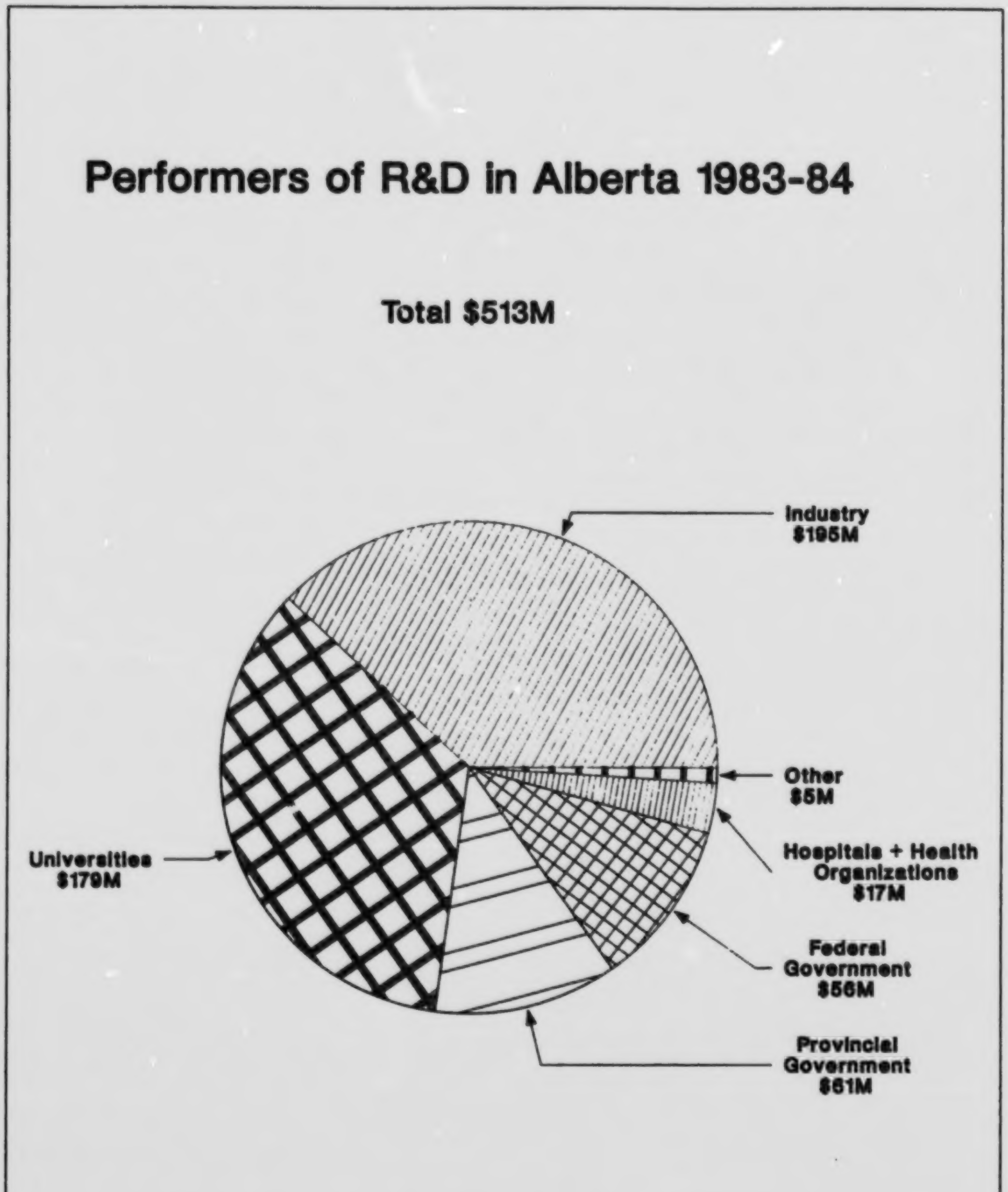
1. PREFACE

This report describes the characteristics and magnitude of research and science expenditures in Alberta during the fiscal year 1983-84. An introductory section provides background information and outlines the organization of the report. Section I outlines research and development expenditures in Alberta by all funding and performing sectors, and examines areas of application and personnel components. Section II focuses on the Alberta Government's expenditures for both research and development and related scientific activities and draws comparisons with expenditures of other provincial governments. Section III provides an overview of specific research programs and facilities in the Province.

The data contained in this report were based primarily on an annual Statistics Canada survey of scientific activities of the Government of Alberta, various other statistical surveys conducted by Statistics Canada, and estimates produced by the Planning Secretariat of Alberta Advanced Education.

As this report is exploratory in nature and represents one of the few attempts at documenting all expenditures on research and science in Alberta, it should be used with caution. Due to limitations in the available data, these figures should be considered only as reasonable approximations.

FIGURE 1



Performers of R&D in Alberta 1983-84

Total $513M

2. SUMMARY OF MAJOR FINDINGS AND OBSERVATIONS

1. **Total Research And Development Expenditures By All Sectors In The Province Were Approximately $513 Million During The Fiscal Year 1983-84 (Table 1).**

   This represents a decrease of 8 percent over the $554 million spent in 1982-83, but continues to account for approximately 10 percent of all research and development expenditures in Canada. On a per capita basis, research and development expenditures in Alberta ($217 per capita) were at the same levels as those for Canada as a whole ($216 per capita). As a proportion of Gross Domestic Product, Alberta's expenditure on research and development was 45 percent lower than that of Canada.

2. **Industry Performed 38 Percent ($195 Million) Of The Total Dollar Value Of Research And Development Activities In Alberta (Table 4).**

   Industry was the primary performer of research and development in Alberta, particularly in the natural sciences. Alberta Industry accounted for 8 percent of all industrial research in Canada. Activities were directed primarily toward oil and gas production and petroleum-based chemical research.

3. **Alberta Universities Performed 35 Percent ($179 Million) Of The Dollar Value Of Research And Development Activities In Alberta, Only Slightly Less Than The Industry Sector (Table 4).**

   Approximately 47 percent of the research performed by Alberta Universities was sponsored by external organizations. Seventy percent of the dollar value of research and development activities performed by Alberta Universities was in the natural sciences; the remaining 30 percent was in the social sciences. Alberta Universities remain the primary performers of research and development in the social sciences and humanities.

4. **The Federal Government Performed 11 Percent ($56 Million) Of The Total Dollar Value Of Research And Development Activities In Alberta (Table 4).**

   The Federal Government, through its research establishments located in Alberta, performed 55 percent of the research and development which it funded in the Province. This amounted to 5 percent of all research and development performed by the Federal Government in Canada.

5. **The Alberta Government, Including The Alberta Research Council, Performed 12 Percent ($61 Million) Of The Total Dollar Value Of Research And Development Activities In Alberta (Table 4).**

   Although the Provincial Government is still considered primarily a funder, rather than a performer, of research and development, intramural expenditures by Alberta Government Departments increased 19 percent in 1983-84 over 1982-83. As a proportion of its total expenditure on research and development, the Government of Alberta performed 47 percent of the activities it funded in 1983-84.

6. **The Alberta Government Funded 25 Percent ($129 Million) Of All Research And Development In Alberta (Table 2).**

   With an increase of 10 percent over 1982-83 expenditures, the Alberta Government expended more for research and development than any other provincial government surveyed. On a per capita basis, the Alberta Government continued to fund research and development at over three times the level of any other provincial government.

7. **The Federal Government Funded 20 Percent ($103 Million) Of Research And Development In Alberta (Table 2).**

   This represents an increase of $11 million over the $92 million spent in 1982-83, and accounts for approximately 5 percent of the Federal Government's total research and development expenditures in Canada. The Federal Government was the major contributor to sponsored research at Alberta Universities.

8. **Industry Funded 29 Percent ($150 Million) Of Research And Development In Alberta (Table 2).**

   Industry decreased its expenditures on research and development in Alberta by $70 million over 1982-83, due primarily to decreases in expenditures by the petroleum recovery industries. Alberta Industry's share of support for research and development was below the Canadian average.

9. **Alberta Universities, From Operating Funds, Supported 18 Percent ($94 Million) Of Research And Development In Alberta (Table 2).**

   Universities are estimated to have increased their support of unsponsored research by $7 million over 1982-83. In addition, sponsored research in the university sector has grown by 13 percent from $75 million in 1982-83 to $85 million in 1983-84.

10. **Natural Sciences Research And Development Expenditures In Alberta Were Approximately $458 Million. Social Sciences and Humanities Research And Development Expenditures Were Approximately $55 Million (Table 1).**

    Natural sciences research and development activity accounted for 89 percent of all research and development expenditures in Alberta, with the remaining 11 percent expended in social sciences research.

11. **Approximately 32 Percent ($162 Million) Of Research And Development Expenditures In Alberta Were Directed Toward The Area Of Energy and Fuels (Table 5).**

    This is a considerably lower level of energy research than in past years (41 percent of research and development in 1982-83), and is accounted for primarily by decreased spending in the industrial sector. Proportionate increases were seen in health and social development, and in industrial and economic development.

12. **Excluding University Personnel, 1 516 Scientific And Professional Personnel As Well As 1 878 Technical And Other Support Personnel Were Employed In Research And Development Activity In Alberta (Table 6).**

    Of scientific and professional personnel employed in Alberta, (excluding those employed by Universities), 58 percent were employed in Industry, 20 percent in Federal establishments, 12 percent in Alberta Government Departments and 10 percent in the Alberta Research Council.

13. **Total Expenditures On Scientific Activity By The Alberta Government Were $189 Million In 1983-84 (Table 8).**

    Of total scientific activity expenditures, approximately $129 million was directed toward research and development and $61 million was expended for related scientific activities. Expenditures for scientific activity increased 9 percent over the preceding fiscal year.

BACKGROUND AND TECHNICAL NOTES

1. INTRODUCTION

Research and science continue to play an increasingly important role in the economies of both Canada and the Province of Alberta. There is every indication that the future economic strength of the Province and the nation will be strongly influenced by the support of research and development by industry, universities, and government.

This report describes the characteristics and magnitude of scientific expenditures in Alberta. It outlines the research and development expenditures in Alberta by all who fund or support such activities. Particular attention is paid to the support provided by the Government of Alberta.

The data upon which this report is based are difficult to compile in a consistent fashion. While the methods used in the preparation of this material have been improving, caution should be exercised in drawing comparisons with other similar data sources.

1.1 Background

Since 1973-74, an annual survey of the scientific activities of the Government of Alberta has been carried out by Statistics Canada (currently in cooperation with the Department of Advanced Education and the Alberta Bureau of Statistics). This survey provides the only continuing historical data base on the scientific activities of the Government of Alberta, and represents one of the few reliable data bases available to review the overall scientific activities of the Alberta Government. (The 1983-84 survey results are found in Appendix A.)

In order to provide a comprehensive data base to aid in formulating policy decisions, the results of this survey have been placed in a broader comparative context. Research and Science in Alberta, 1983-84 offers a broad examination of the existing data relating to the scientific expenditures of the Federal Government, Alberta Industry, Alberta Universities, and other Provincial Governments as well as the Government of Alberta. By comparing the contributions of each sector of the Alberta and Canadian economies, a clearer perspective of the total effort of research and science may emerge. There has been a growing recognition among all governments of the important place of research and development in an expanding economy. As a result, similar provincial surveys of scientific activities are currently conducted in four provinces: British Columbia, Alberta, Saskatchewan and Ontario. New Brunswick instituted a partial survey in 1983-84, and the Manitoba Government will conduct a full survey in 1984-85.

1.2 Data Sources And Cautionary Notes

The data contained in this report are based on Statistics Canada surveys of scientific activities and on estimates produced by the Planning Secretariat of the Alberta Department of Advanced Education. Due to limitations in source information, these estimates should be considered only as reasonable approximations.

Information on scientific expenditures in Alberta has been collected, where possible, as reported by the funder. This approach is feasible when dealing with federal or provincial governments, as annual surveys of their science expenditures reflect payments to all performing sectors. For various reasons a performer may not identify the same funding as the agency providing the funding. Therefore, discrepancies arise when the performer's report is the only source of data for a given sector.

This is the case when accounting for expenditures by industry. The Statistics Canada publication, Industrial Research and Development Statistics, offers data from an annual survey of Canadian industry engaged in scientific activities. Since the publication summarizes expenditures by report of the performer, irreconcilable differences exist between these figures and those reported in similar data sources by survey of the funder. Therefore, caution should be exercised when comparing figures from various data sources.

Data on university expenditures are estimates produced by the Planning Secretariat of Alberta Advanced Education. These estimates are derived from annual financial statements of Alberta universities and from studies which indicate that a fixed percentage of the operating expenditures of universities is attributable to research and development activity (Report of the Study on the Costs of University Research, Canadian Association of University Business Officers, 1982). Estimates of university expenditures on research and development present the greatest potential for error; however, no figures of a more precise nature currently exist. (A brief discussion of the methodology used in deriving these data is contained in Appendix C.)

All figures in this report, unless otherwise noted, refer to expenditures on research and development only. In order to estimate the extent of research and development activity in Alberta, foreign payments to Industry for research performed in Alberta are included, but payments for research performed outside of the country are not. Capital expenditures on research and development are included for all sectors, with the exception of the University sector (See Appendix C). All figures are in current dollars.

1.3 Definitions

Scientific activities are defined as those scientific and technological activities which involve the generation, dissemination and initial application of new scientific and technological knowledge. These activities include both research and development activities and related scientific activities. Scientific activities are classified as belonging either to the natural sciences and engineering, or to the social sciences and humanities. (Detailed definitions of the terms used in this report are found in Appendix B.)

Research and development activities are defined as creative work undertaken on a systematic basis towards the acquisition and application of new scientific and technological knowledge.

Related scientific activities are defined as those activities which are supportive of research and development, but which do not include the acquisition of new knowledge. By convention, they include such activities as education support, statistical surveys, information services, special services and studies (systematic investigations carried out to provide information needed for planning or policy formulation), and the provision of museum services.

1.4 Outline

This report consists of three major sections. The first statistical section 'Research and Development in Alberta', outlines expenditures for research and development in Alberta for the fiscal year 1983-84, identifies the major funders and performers of these activities, and describes research and development by area of application.

The second statistical section, 'Scientific Activities of the Government of Alberta', provides a more detailed view of the Alberta Government's expenditures. It includes information on both research and development activities and related scientific activities. Comparisons have been made with other provincial governments for which data are available.

The third section, 'Overview of Research and Science in Alberta', is a narrative, and new to the report this year. Although a summary of science expenditure data is integral to policy formulation, a more comprehensive information base should include some description of the specific nature of research activity in the Province. The final section of the report, therefore, provides an overview of the activities of various research funding and performing sectors in Alberta.

SECTION I
RESEARCH AND DEVELOPMENT IN ALBERTA: STATISTICS 1983-84

1. INTRODUCTION

This section describes the characteristics and magnitude of research and development expenditures in Alberta during the fiscal year 1983-84. It outlines the expenditures of the Alberta Government, the Federal Government, Universities, Industry, and 'Others', and identifies the major performers of research and development. Areas of application have been identified, as have the personnel components of each sector.

2. RESEARCH AND DEVELOPMENT EXPENDITURES

In 1983-84, approximately $513 million was spent on research and development activities in Alberta. This represented a decrease of 8 percent over 1982-83, and accounted for approximately 10 percent of all research and development expenditures in Canada (Table 1).

As an indication of how expenditures on research and development relate to the overall performance of the economy, it is possible to express research and development as a percentage of Gross Domestic Product (GDP). Research and development accounted for .92 percent of Alberta's GDP in 1983-84, down from 1.04 in 1982-83. The comparable research and development expenditure in Canada was 1.33 percent of the nation's GDP (1.35 percent for 1982-83).[1]

However, it should be noted that differences in industrial structure between regions tend to distort this type of calculation. The greatest opportunity for research and development investment exists in the manufacturing sector. Alberta's largely resource-based economy puts the Province at an apparent disadvantage when GDP is employed as a measure of research and development intensity.

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[1] Alberta Advanced Education, Planning Secretariat, estimates, July, 1985; Alberta Bureau of Statistics, Alberta Economic Accounts 1983; Statistics Canada, Scientific Activities of the Government of Alberta 1983-84 Survey Results.

TABLE 1

RESEARCH AND DEVELOPMENT EXPENDITURES IN ALBERTA 1982-83 AND 1983-84, AND CANADA 1983-84

Field of Science	$ Millions (%)					
	Alberta 1982-83(r)		Alberta 1983-84		Canada 1983-84	
Natural Sciences	503	(91)	458	(89)	4 876	(91)
Social Sciences	50	(9)	55	(11)	489	(9)
Total	554	(100)	513	(100)	5 365	(100)

Sources: Alberta Advanced Education, Research and Science in Alberta 1982-83; Alberta Advanced Education, Planning Secretariat, estimates, July, 1985; Alberta Research Council, Annual Report 1984; Statistics Canada, Federal Scientific Establishments 1983-84; Statistics Canada, Scientific Activities of the Government of Alberta 1983-84 Survey Results; Statistics Canada, Science, Technology and Capital Stock Division, estimates, May, 1985; University of Alberta, Report of the Governors 1983-84; University of Calgary, Annual Report 1983-84; University of Lethbridge, Financial Statements 1983-84.

Recognizing the limitations of the measure, the Organization for Economic Cooperation and Development[1] has recommended calculating these statistics on a per capita basis. When this procedure is applied to Alberta statistics, the Province fares more favourably: expenditures are either comparable with those elsewhere in Canada, or higher. In 1983-84 roughly $217 per capita were spent on research and development activities in Alberta, compared with $216 per capita in Canada. In 1982-83 about $239 per capita were spent on research and development in Alberta as compared with $204 per capita across Canada.[2]

2.1 Research and Development Expenditures in the Natural Sciences

In Alberta, research and development expenditures in the natural sciences were approximately $458 million in 1983-84, down by 10 percent over 1982-83. These expenditures represented roughly 89 percent of all research and development expenditures in Alberta, and 9 percent of all natural science research and development expenditures in Canada. Approximately $194 per capita were expended on natural science research and development activities in Alberta, while approximately $196 per capita were expended on natural science research and development activities in Canada.

2.2 Research and Development Expenditures in the Social Sciences and Humanities

In Alberta, research and development expenditures in the social sciences were approximately $55 million in 1983-84, an increase of $5 million or 10 percent over 1982-83. This represented roughly 11 percent of all research and development expenditures in Alberta, and 11 percent of all social science research and development expenditures in Canada. Approximately $23 per capita were expended on social science research and development activities in Alberta, while approximately $20 per capita were spent on social science research and development in Canada (Table 1).

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[1] OECD Science and Technology Indicators: Resources Devoted to Research and Development, Paris, 1984, p.26.

[2] Alberta Advanced Education, Planning Secretariat, estimates, July, 1985; Alberta Bureau of Statistics, Alberta Economic Accounts 1983; Statistics Canada, Scientific Activities of the Government of Alberta 1983-84 Survey Results.

3. SOURCES OF FUNDS

Alberta's research and development activities were funded by five sectors: the Provincial Government, the Federal Government, Industry, Universities, and 'Others' (primarily private non-profit organizations and foreign sources). In 1983-84, Industry provided 29 percent of all research funds, the Provincial Government 25 percent, the Federal Government 20 percent, Universities 18 percent, and 'Others' 7 percent. (The support by 'Others' includes foreign funding of industrial research and development.) In Canada, Industry funded approximately 39 percent of all research and development expenditures, the Federal Government 36 percent, Universities 11 percent, Provincial Governments 7 percent, and 'Others' 7 percent (Table 2).

3.1 Provincial Government

In 1983-84 the Provincial Government was the second largest funder of research and development activities. The Alberta Government was the source of $129 million in research and development funds, accounting for 25 percent of total research and development expenditures in Alberta (Table 2).

The Alberta Heritage Foundation for Medical Research, funded from the proceeds of a $300 million endowment by the Provincial Government, is considered for the purposes of this analysis, to be a private non-profit research organization. Thus its support of university research ($23 million[1] in 1983-84) is included under 'Others'.

In 1983-84 the Government of Alberta expended more for research and development than did any other provincial government surveyed. In 1983-84, the Ontario Government's expenditures on research and development were roughly $114 million. The British Columbia Government's expenditures on research and development were $23 million, while Saskatchewan's expenditures were

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[1] This figure is as reported by offices of research services at Alberta universities.

TABLE 2

RESEARCH AND DEVELOPMENT EXPENDITURES BY SOURCE OF FUNDS IN ALBERTA 1982-83 AND 1983-84, AND CANADA 1983-84

Source of Funds	$ Millions (%)					
	Alberta 1982-83(r)		Alberta 1983-84		Canada 1983-84	
Provincial Government(s)	117	(21)	129	(25)	398	(7)
Federal Government	92	(17)	103	(20)	1 955	(36)
Industry	220	(40)	150	(29)	2 069	(39)
Universities	87	(16)	94	(18)	567	(11)
Others	37	(7)	38	(7)	375	(7)
Total	554	(100)	513	(100)	5 365	(100)

Sources: See Table 1.

TABLE 3

RESEARCH AND DEVELOPMENT EXPENDITURES OF SELECTED PROVINCIAL GOVERNMENTS AND THE FEDERAL GOVERNMENT 1983-84

Field of Science	Governments $ Millions (%)									
	Alberta		Ontario		Saskatchewan		British Columbia		Federal (in Canada)	
Natural Sciences	126	(98)	91	(80)	16	(95)	23	(98)	1 852	(95)
Social Sciences	2	(2)	23	(20)	1	(5)	1	(2)	103	(5)
Total	129	(100)	114	(100)	17	(100)	23	(100)	1 955	(100)

Sources: Statistics Canada, annual surveys of scientific activities of the respective provinces, 1983-84; Statistics Canada, Science, Technology and Capital Stock Division, estimates, May, 1985.

$17 million. On a per capita basis, the Alberta Government spent over three times more on research and development than any other provincial government for which data were available (Table 3).

3.2 Federal Government

In 1983-84, the Federal Government funded approximately $103 million of research and development in Alberta, up from $92 million in 1982-83.[1] This sector was the source of approximately 20 percent of all research and development expenditures in Alberta, compared with 36 percent of all research and development in Canada. Support of research in Alberta accounted for 5 percent of the Federal Government's total research and development expenditures in Canada (Table 2).

In 1983-84, the Federal Government's extramural expenditures on research and development in Alberta were approximately $46 million, excluding money transferred to the Province through the Alberta/Canada Energy Resources Research Fund. (Funds which were transferred to the Province under this agreement are reported as provincial research and development expenditures.)

3.3 Industry

Although in 1983-84 Industry remained the primary funder of research and development in Alberta, its expenditures decreased 46 percent over 1982-83. Alberta Industry spent approximately $150 million on research and development in 1983-84, down from $220 million in 1982-83. Accordingly, the proportion of research in Alberta funded by the private sector decreased from 40 percent in 1982-83 to 29 percent in 1983-84. Alberta Industry's expenditures on research and development as a proportion of all Industry funded research and development in Canada decreased to 7 percent in 1983-84 from 11 percent in 1982-83 (Table 2).

Part of the decrease can be accounted for by a reduction in capital projects. Beginning in 1979-80, Alberta Industry made significant capital expenditures on research facilities (including land, buildings and equipment). As acquisition slowed in 1983-84, capital expenditures decreased 89 percent over 1982-83, falling from $85 million to $45 million. (See section 4.1 for further discussion of the recent pattern of expenditures in this sector.)

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[1] Federal tax incentives to the private sector are not considered direct funding for research and development, and are therefore not included in this summary.

3.4 Universities

In 1983-84, it is estimated that Alberta Universities, through their operating budgets, funded approximately $94 million of research and development activities in Alberta, up from $87 million in 1982-83. This sector accounted for approximately 18 percent of all research and development expenditures in Alberta, and represented 17 percent of all expenditures by Canadian Universities on research and development in Canada (Table 2). (These estimates do not include research supported by sources external to the universities, as these funds are recorded under the sector which provided the funds. See Appendix C for the methodology used to estimate university support for research and development activities.)

3.5 'Others'

'Other' organizations, primarily private non-profit organizations and foreign sources, funded approximately $38 million of research and development activities in Alberta in 1983-84. This sector accounted for approximately 7 percent of all expenditures on research and development in Alberta and approximately 10 percent of total expenditures by 'Other' funders on research and development in Canada (Table 2).

Foreign funding of industrial research and development ($6 million) decreased to half its 1982-83 level ($12 million). The remaining funds reported as 'Other' (approximately $32 million) were provided primarily by Alberta's private non-profit organizations for research and development performed by the University sector. The Alberta Heritage Foundation for Medical Research accounted for the largest expenditure by a private non-profit organization, providing $23 million[1] to Alberta Universities for research and development activities.

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[1] This figure is as reported by offices of research services at Alberta universities.

4. PERFORMERS

The two major performers of research and development in Alberta were the Industry and University sectors. Together these sectors accounted for 73 percent of the dollar value of research and development activities in Alberta. The Federal Government and Provincial Government Departments accounted, respectively, for 11 percent and 5 percent of all research and development performed in Alberta. The Alberta Research Council accounted for an additional 6 percent of expenditures for research and development activities in 1983-84 (Table 4).

4.1 Industry

In 1983-84 Industry remained the primary performer of research and development in Alberta in spite of a 38 percent decrease in intramural expenditures. Industry accounted for $195 million or approximately 38 percent of the total dollar value of research and development activities in Alberta. Nationally, Industry accounted for 47 percent of all expenditures for research and development (Table 4).

The substantial decrease in industrial research and development activity marks a continuation of the decline first observed in 1982-83. Remarkable expansion between 1977-78 and 1981-82 led to an increase of 250 percent in intramural expenditures by Alberta Industry, compared with an increase of 148 percent over the same time period across Canada. But by 1982-83, decreased spending in Alberta petroleum recovery industries contributed to an overall decrease of 4 percent over 1981-82 levels.

The further decrease in 1983-84 industrial expenditures appears to have resulted from continued reductions in research and development spending in the petroleum recovery industries, where expenditures decreased from $203 million in 1982-83 to $127 million in 1983-84. However, research and development expenditures in the service industries continued to show a slight increase (7 percent) over 1982-83 levels.

TABLE 4

RESEARCH AND DEVELOPMENT EXPENDITURES BY PERFORMER IN ALBERTA 1982-83 AND 1983-84, AND CANADA 1983-84

Performer	$ Millions (%)					
	Alberta 1982-83(r)		Alberta 1983-84		Canada 1983-84	
Provincial Government(s)						
Intramural	23	(4)	27	(5)	160	(3)
Research Council(s)	34	(6)	33	(6)	59	(1)
Subtotal	56	(10)	61	(12)	219	(4)
Federal Government	50	(9)	56	(11)	1 224	(23)
Industry	271	(49)	195	(38)	2 518	(47)
Universities	162	(29)	179	(35)	1 341	(25)
Others						
Hospitals and Health Organizations	11	(2)	17	(3)	..	..
Other	3	(1)	5	(1)	..	..
Subtotal	14	(3)	22	(4)	63	(1)
Total	554	(100)	513	(100)	5 365	(100)

Sources: See Table 1.

Of the $195 million expended intramurally by Industry, funds for 16 percent (approximately $32 million), were received from the Provincial Government and 5 percent (approximately $10 million) was received from the Federal Government, for a total of approximately $40 million. Foreign support for research and development performed by Alberta Industry amounted to $6 million, accounting for 3 percent of Industry's research and development funding.

4.2 Universities

The second major performer of research and development activities in Alberta in 1983-84 was the University sector. It performed approximately 35 percent or $179 million of research and development activities in Alberta, compared with the Canadian average for Universities of 25 percent (Table 4).

Approximately 70 percent was in the natural sciences where, with expenditures of $125 million, Alberta Universities performed approximately 27 percent of the dollar value of natural science research and development activities in the Province. The remaining 30 percent of research and development performed by Alberta Universities was in the social sciences and humanities.

Universities are the major performers of research and development in the social sciences and humanities. The $54 million in social science research performed by Alberta Universities accounted for 97 percent of the total dollar value of social science research in Alberta. This particularly high contribution results partly from the fact that, although other sectors are active in scientific activities in the social sciences, little of their work can be classified as research and development. For example, in 1983-84 Provincial Government Departments performed $18 million of scientific activity in the area of social sciences, but of this only one half million dollars was designated as research and development.

Approximately 47 percent of the dollar value of the research and development performed by the Universities was sponsored or funded by external organizations. The remaining 53 percent was funded through university operating budgets. Approximately 8 percent of the total dollar value of research and development performed by the Universities in the social sciences was sponsored by external organizations, compared to 64 percent sponsorship in the natural sciences.

The major external sponsor of research activities at Alberta Universities is the Federal Government, accounting for 43 percent of all sponsored research in 1983-84. The Alberta Heritage Foundation for Medical Research accounted for 27 percent; other private non-profit organizations funded 10 percent; the Provincial Government 16 percent; and Industry 3 percent.

4.3 Federal Government

In 1983-84, Federal Government scientific establishments located in Alberta expended $56 million, a 12 percent increase over 1982-83 expenditures. Research conducted by the Federal Government in Alberta accounted for 11 percent of all research and development in the Province. Nationally, Federal Government research and development accounted for 23 percent of research and development expenditures in Canada. Virtually all research performed by the Federal Government in Alberta was in the natural sciences (Table 4).

4.4 Provincial Government

Although the Provincial Government is still considered primarily a funder rather than a performer of research and development, intramural expenditures by the Alberta Government Departments rose from $23 million in 1982-83 to $27 million in 1983-84, a 19 percent increase in research and development activities (Table 4). Together, the Alberta Provincial Departments and the Alberta Research Council performed 12 percent of all research and development activities in Alberta.

Provincial Government Departments performed approximately 21 percent of the total dollar value of research and development activities funded by the Government of Alberta, and the Alberta Research Council performed another 26 percent. Other provincial governments performed proportionately more of the research they funded, and the provincial research organizations proportionately less. The Alberta Government contributed a substantially greater share of research funds to hospitals and health organizations than did other provincial governments.

During 1983-84, British Columbia performed 53 percent of the value of research and development it funded, with an additional 5 percent performed by the British Columbia Research Council. In Saskatchewan, 22 percent was performed intramurally and 23 percent was performed by the Saskatchewan Research Council. The Ontario Government performed 48 percent of the total dollar value of the research and development activities it funded, and the Ontario Research Foundation performed an additional 4 percent.

Industry was commissioned to perform approximately 25 percent of the total dollar value of the Alberta Government's expenditures on research and development. The proportion of the Ontario Government's expenditures performed by Industry was 10 percent; in British Columbia it was 8 percent; in Saskatchewan, Industry's share was 20 percent.

Universities received approximately 11 percent of the Alberta Government's research and development funds. The comparable figure for Saskatchewan was 33 percent, for Ontario 28 percent, and for British Columbia 23 percent.

'Other' performers, including hospitals and health organizations, received approximately 17 percent of the Alberta Government's expenditures for research and development. The comparable figure for Ontario was 9 percent, for British Columbia 9 percent, and for Saskatchewan 2 percent.

5. APPLICATION

Data collected on Provincial Government expenditures by area of application are fairly reliable from year to year. However, techniques used in combining this information with information on application of expenditures in other sectors (Industry, the Federal Government, and the Universities) lack precision. For this reason caution should be exercised when interpreting these figures.

The primary performers of research and development are identified for each application area; however, no attempt has been made to categorize expenditures by funding source. Although sectors may have a strong focus in the performance of research and development (such as Industry's role in energy and fuels research), it should be remembered that funding is often received from several agencies. Because the Government of Alberta can be considered primarily a funder rather than a performer of research, its support role in many areas of application may be overlooked. In 1983-84, the Provincial Government was the source of 25 percent of all research and development expenditures in the Province. (Refer to Table 10 for a summary of total science expenditures of the Government of Alberta by area of application.)

Research and development expenditures have been broken into eight areas of application: Advancement of Science, Defence, Energy and Fuels, Environmental Issues, Health, Industrial and Economic Development, Social Development and Related Areas, and Transportation and Communications (Table 5).

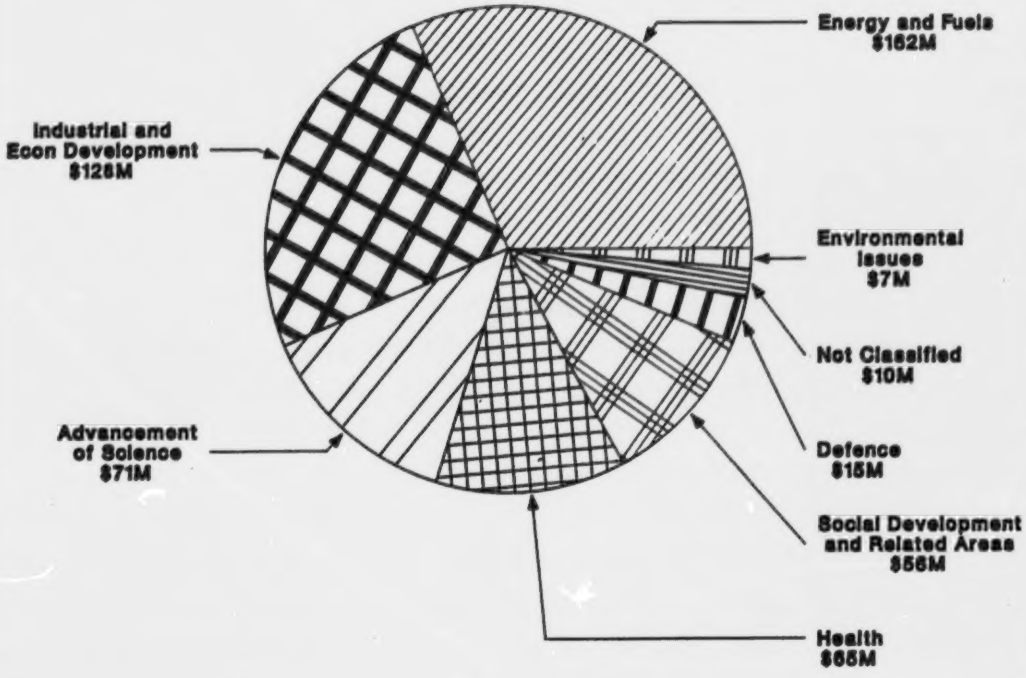
5.1 Advancement of Science

It is estimated that approximately $71 million was spent on research and development activities related to the general advancement of science. This represented roughly 14 percent of all research and development expenditures in Alberta. With the exception of approximately $1 million of research performed by the Alberta Research Council, this figure largely reflects the activities of Alberta's Universities. In 1983-84, the University sector accounted for 97 percent of research activity related to the advancement of science (Table 5).

FIGURE 2

Application of R&D Expenditures 1983-84

Total $513M



The classification of research and development activities under this heading, in particular, involves problems of definition. This area involves research done for the general advancement of science and refers to basic rather than applied research. With the exception of the activities of a few faculties (such as Agriculture and Forestry, or Medicine, where area of application is reasonably clear), it is often difficult to classify the research activities of the universities. In recognition of the major role played by the universities in augmenting existing knowledge in all fields, much of their research activity was identified as serving the advancement of science.

5.2 Defence

Approximately $15 million was spent on activities related to defence, 3 percent of total research and development expenditures. Only the Federal Government reported expenditures in this application area.

5.3 Energy and Fuels

Approximately $162 million was spent on research and development activities in the area of energy and fuels in Alberta in 1983-84, representing 32 percent of all research and development expenditures in Alberta. The major performer of research and development activities in energy and fuels was Industry, accounting for 78 percent of expenditures in this area of application. The Provincial Government performed 8 percent, the Federal Government 6 percent, and the Alberta Research Council 7 percent (Table 5).

Energy and fuels includes the sub-fields of fossil fuels, hydro-electric energy, and nuclear energy. It appears that most of the expenditures in this area were related to fossil fuels.

5.4 Environmental Issues

An estimated $7 million was spent on research and development activities related to environmental issues. The Alberta Research Council and Alberta Government Departments were the primary performers, each accounting for approximately 50 percent of expenditures in this area (Table 5).

TABLE 5

APPLICATION OF RESEARCH AND DEVELOPMENT EXPENDITURES IN ALBERTA 1982-83 AND 1983-84

Area of Application	**$ Millions (%)**			
	1982-83(r)		**1983-84**	
Advancement of Science	69	(13)	71	(14)
Defence	11	(2)	15	(3)
Energy and Fuels	229	(41)	162	(32)
Environmental Issues	8	(1)	7	(1)
Health	53	(10)	65	(13)
Industrial and Economic Development:				
Agriculture	39	(7)	42	(8)
Other	82	(15)	86	(17)
Subtotal	122	(22)	128	(25)
Social Development and Related Areas	50	(9)	56	(11)
Transportation and Communications[1]	..	(..)	..	(..)
Not Classified[2]	11	(2)	10	(2)
Total	554	(100)	513	(100)

Notes: 1. Disaggregated data for industrial research and development in this category are not available from Statistics Canada. Industrial communications research in the Province is reported in the broader category of industrial and economic development.

2. In order to comply with the secrecy section of the Statistics Act, Industry may not list expenditures for certain industry groupings. For this reason expenditures of approximately $10 million per year could not be grouped by application area.

Source: Alberta Advanced Education, Planning Secretariat, estimates, July, 1985.

The area of environmental issues includes research activities intended to preserve or restore environmental quality, including work on pollution, but excluding related medical research.

5.5 Health

It is estimated that approximately $65 million was spent on health-related research and development activities in Alberta in 1983-84. This represented roughly 13 percent of all research and development expenditures in Alberta. Universities accounted for 71 percent of health related research and development and hospitals and health organizations 27 percent (Table 5).

The area of health involves activities related to the maintenance and improvement of the physical well-being of the population. Included are research activities in medicine, dentistry, pharmacy, nursing and rehabilitation medicine.

5.6 Industrial and Economic Development

It is estimated that approximately $128 million was spent on research and development activities in the area of industrial and economic development, representing roughly 25 percent of all research and development expenditures in Alberta in 1983-84. The private sector accounted for 45 percent of research and development in this application area, with expenditures of $28 million in manufacturing and $30 million in the service industries. The Federal Government performed the second largest share of research in this area (25 percent) in its research establishments throughout the Province. The Alberta Research Council accounted for 14 percent, the University sector 8 percent, and the Provincial Government Departments 6 percent (Table 5).

Industrial and economic development includes research activities related to agriculture, fisheries, forestry, manufacturing and minerals. In 1983-84, $42 million was directed towards research and development related to agriculture. The Federal Government was the primary performer in this area with approximately $24 million expended on agricultural research and development, while the Provincial Government, including the Alberta Research Council, expended an additional $10 million.

5.7 Social Development and Related Areas

It is estimated that approximately $56 million was spent on research and development activities in the area of social development, 11 percent of all research and development in Alberta. Universities accounted for essentially all research expenditures in this area (Table 5).

This area of application includes the sub-fields of culture, sport, recreation, education, human resources, and urban and regional studies.

6. PERSONNEL[1]

Only recently have consistent figures on the personnel component of research and development activities become available. However, data gathering remains hindered by significant technical and conceptual problems, making accurate assessments difficult.

For comparative purposes, the unit of 'person-year' is used to indicate a full-time equivalent staff position engaged directly in research and development. This allows an individual's time to be apportioned to different activity categories where that person is engaged in a variety of tasks, only some related to research and development.

Individuals engaged in research and development are classified either as 'professional and scientific personnel' or as 'technical and other support personnel'. (See Appendix B for definitions.)

6.1 Total Employment in Research and Development

The equivalent of 1 516 full-time persons were employed in a scientific or professional capacity engaged in research and development activities in the Province, not including the equivalent of 1 700 persons engaged in research in Alberta's Universities. The equivalent of an additional 1 878 persons, excluding those at Alberta Universities, were engaged on a full-time basis in a technical or other support capacity in an occupation related to research and development (Table 6).

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[1] Figures in this section indicate full-time equivalents or 'person-years'. Because each individual may be engaged in a variety of tasks apart from those directly related to research and development, the actual number of people who were employed in an occupation related to research and development would be several times greater than the figures quoted here.

TABLE 6

PERSONNEL ENGAGED IN INTRAMURAL RESEARCH AND DEVELOPMENT IN ALBERTA AND CANADA 1983-84 (PERSON-YEARS)

Sector and Field Of Employment	Scientific And Professional		Technical and Other Support		Total	
	Alberta	Canada	Alberta	Canada	Alberta	Canada
Provincial Government						
Natural Sciences	159	1 060	189	1 650	348	2 710
Social Sciences	16	170	5	140	21	310
Total	175	1 230	194	1 790	369	3 020
Provincial Research Organization(s)	157	406	187	555	344	961
Federal Government						
Natural Sciences	304	..	722	..	1 025	..
Social Sciences	--	..	--	..	--	..
Total	304	5 208	722	11 298	1 025	16 506
Industry	880	17 550	775	17 845	1 655	35 400

Sources: Statistics Canada, Federal Scientific Establishments, 1983-84; Statistics Canada, "The Provincial Research Organizations 1983", Science Statistics, Vol. 8, #11; Statistics Canada, Scientific Activities of the Government of Alberta 1983-84 Survey Results; Statistics Canada, Science, Technology and Capital Stock Division, estimates, July, 1985.

6.2 Provincial Government

The Alberta Government employed the equivalent of 175 scientific and professional persons during 1983-84, 159 of whom were engaged in natural science research. In addition, 157 scientific and professional persons were employed by the Alberta Research Council. The Provincial Government also employed the equivalent of 194 technical and other support persons, while the Alberta Research Council employed approximately 187 persons (Table 6).

The Alberta Government spent approximately $154 000 per professional researcher from its intramural research and development funds, up from $131 000 in 1982-83 (Table 7).

6.3 Federal Government

In the 15 federal research establishments located in Alberta, the Federal Government employed 304 scientific and professional persons or 6 percent of those employed in federal research establishments across Canada. Essentially all of these persons were engaged in natural science research and development. An additional 722 persons were employed in technical or support capacities (Table 6).

In 1983-84, the Federal Government spent $184 000 per professional research person in its Alberta establishments. Nationally, the Federal Government spent $235 000 on each of its professional research staff across Canada (Table 7).

6.4 Industry

Industry in Alberta employed 880 full-time equivalent scientific and professional personnel during 1983-84, about 5 percent of the total across Canada. An additional 775 persons were employed in technical or support capacities (Table 6).

In 1983-84, Alberta Industry spent $222 000 per professional research person, considerably greater than the Canadian average for Industry of $143 000 (Table 7).

TABLE 7

INTRAMURAL RESEARCH AND DEVELOPMENT EXPENDITURES PER SCIENTIFIC AND PROFESSIONAL PERSON ALBERTA AND CANADA 1983-84

	Provincial Government	Provincial Research Organizations	Federal Government	Industry
Alberta:				
Intramural R&D Expenditure ($ Millions)	27	33	56	195
Scientific and Professional Personnel (Person - Years)	175	157	304	880
Expenditure/Professional Person ($ Thousands)	154	210	184	222
Canada:				
Intramural R&D Expenditure ($ Millions)	160	59	1 224	2 518
Scientific and Professional Personnel (Person - Years)	1 230	406	5 208	17 550
Expenditure/Professional Person ($ Thousands)	130	145	235	143

Sources: Statistics Canada, Federal Scientific Establishments, 1983-84; Statistics Canada, Scientific Activities of the Government of Alberta 1983-84 Survey Results; Statistics Canada, Science, Technology and Capital Stock Division, estimates, July, 1985.

6.5 Universities

In theory, each of the 4 600 academic staff members in Alberta's Universities is a scientific or professional person directly engaged in research activities. However, the instructional and community service obligations of faculty members restrict the amount of time which may be committed to research activities. The full-time equivalent figure for staff engaged solely in research activities is estimated to be approximately 1 700 person-years for all Alberta Universities.

SECTION II

SCIENTIFIC ACTIVITIES OF THE GOVERNMENT OF ALBERTA: STATISTICS 1983-84

1. INTRODUCTION

This section summarizes the major findings of the report, Scientific Activities of the Government of Alberta, 1983-84 Survey Results (Appendix A). This section also provides comparative data on the 1983-84 expenditures of the Provincial Governments of Ontario, British Columbia and Saskatchewan.

Scientific activities are those activities which involve the generation, dissemination and initial application of new scientific knowledge and technology. Included are both research and development activities and related scientific activities. Related scientific activities are activities ancillary to research and development, which do not include the acquisition of new knowledge. They do include such activities as scientific data collection, feasibility studies, operations and policy studies, and educational support. Only the Federal Government and selected provincial governments collect expenditure data on related scientific activities.

2. TRENDS

Between 1977-78 and 1983-84, expenditures by the Government of Alberta for scientific activity increased 191 percent. The Saskatchewan Government increased expenditures 137 percent over the same period, the British Columbia Government 91 percent, and the Ontario Government 71 percent (see Figure 3).

The substantial increase in science expenditures by the Alberta Government over this seven year period is attributable to increased support by a number of departments. In 1983-84, the Department of Hospitals and Medical Care expended $22 million for scientific activity, an increase of 594 percent over its 1977-78 expenditure; the Department of Energy and Natural Resources expended $29 million, a 450 percent increase; and Alberta Agriculture expended $20 million, an increase of 421 percent (Appendix A, Table 2).

Research and development have accounted for the majority of the Alberta Government's science expenditures over the past seven years. Figure 4 provides an interprovincial comparison of research and development expenditures and reveals that the Governments of Ontario and Alberta have

FIGURE 3

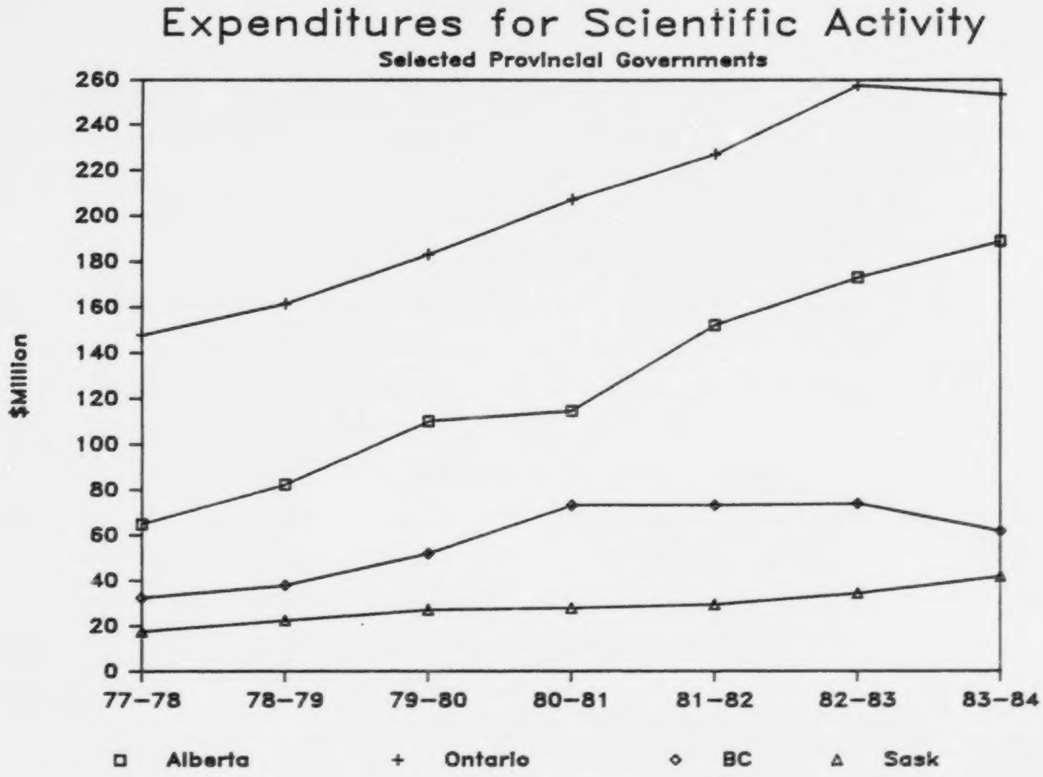
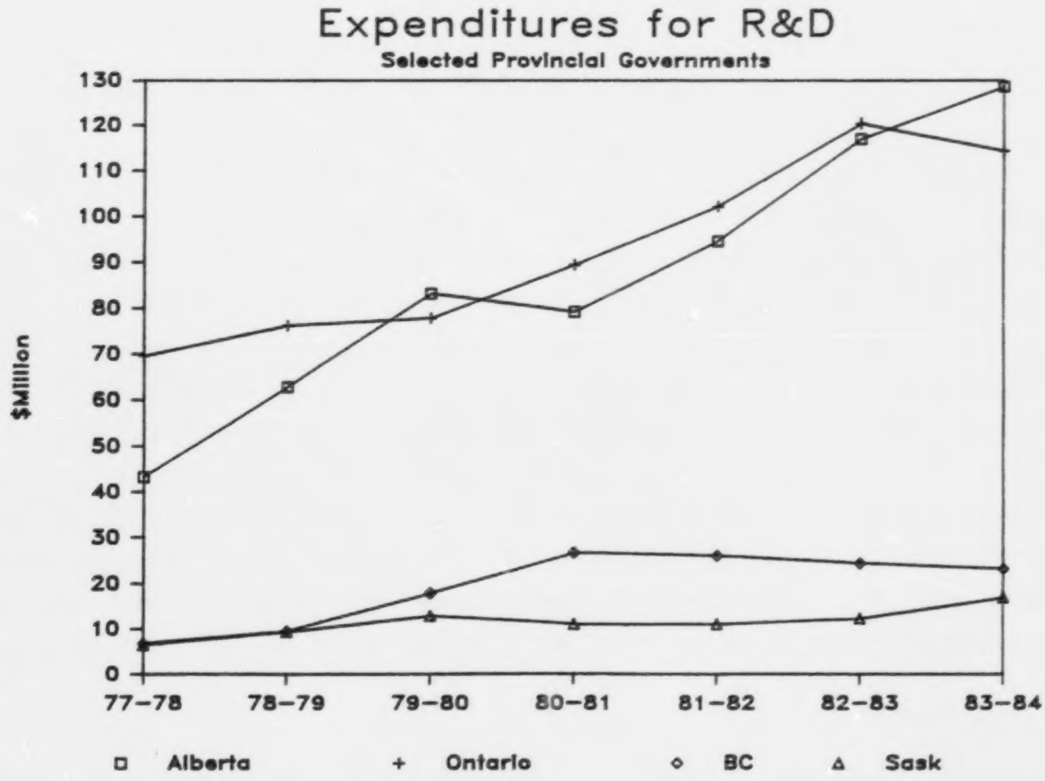


FIGURE 4



consistently led the other provinces surveyed in their support of research and development. By 1983-84 the Alberta Government was expending more for research and development than any other provincial government surveyed.

3. CHARACTERISTICS OF EXPENDITURES

A detailed description of the Alberta Government's expenditures on scientific activities for the year 1983-84 can be found in Appendix A. The following discussion highlights some of the important characteristics of these expenditures and draws comparisons with other provincial governments (Table 8).

Table 8 indicates that the Alberta Government's science expenditures show a somewhat different distribution from expenditures by other governments surveyed. Comparatively more funds are directed toward activities in the natural sciences, with the majority of expenditures supporting research and development. In 1983-84, 84 percent ($159 million of the Alberta Government's science expenditure) supported natural science activities, and of this, 79 percent ($126 million) was devoted to research and development.

This relatively high proportion of research and development in the natural sciences is maintained primarily by three departments or agencies. The Alberta Oil Sands Technology Research Authority accounted for approximately 35 percent ($41 million) of current expenditures for natural science research and development in 1983-84. Expenditures by the Department of Hospitals and Medical Care and the Executive Council's payments to the Alberta Research Council each accounted for an additional 17 percent ($20 million) (Appendix A, Table 25).

TABLE 8

EXPENDITURES ON SCIENTIFIC ACTIVITIES OF SELECTED PROVINCIAL GOVERNMENTS 1983-84

Type of Scientific Activities	Governments $ Millions (%)							
	Alberta		Ontario		Saskatchewan		British Columbia	
Natural Sciences								
Research and Development	126	(79)	91	(58)	16	(53)	23	(47)
Related Scientific Activities	33	(21)	67	(42)	14	(47)	26	(53)
Total Scientific Activities	159	(84)	158	(62)	31	(73)	48	(78)
Social Sciences								
Research and Development	2	(8)	23	(24)	1	(8)	1	(4)
Related Scientific Activities	28	(92)	72	(76)	11	(92)	13	(96)
Total Scientific Activities	30	(16)	96	(38)	12	(27)	13	(22)
Total								
Research and Development	129	(68)	114	(45)	17	(40)	23	(38)
Related Scientific Activities	61	(32)	139	(55)	25	(60)	38	(62)
Total Scientific Activities	189	(100)	254	(100)	42	(100)	62	(100)

Sources: Statistics Canada, annual surveys of scientific activities of participating provinces, 1983-84.

TABLE 9

EXPENDITURES ON SCIENTIFIC ACTIVITIES OF SELECTED PROVINCIAL GOVERNMENTS BY PERFORMER 1983-84

Performer	Governments $ Millions (%)							
	Alberta		Ontario		Saskatchewan		British Columbia	
Intramural	71	(37)	149	(59)	25	(58)	42	(67)
Provincial Research Organization	35	(19)	4	(2)	4	(10)	2	(3)
Hospitals and Health Organizations	17	(9)	8	(3)	--	(--)	--	(--)
Industry	43	(23)	35	(14)	6	(13)	10	(16)
University	15	(8)	45	(18)	6	(15)	6	(9)
Others	9	(5)	11	(5)	1	(3)	3	(5)
Total	189	(100)	254	(100)	42	(100)	62	(100)

Sources: Statistics Canada, annual surveys of scientific activities of participating provinces, 1983-84.

4. PERFORMERS

Compared with other provincial governments, the Alberta Government performs a relatively small proportion (37 percent) of the scientific activities it funds. Conversely, it expends a greater proportion (19 percent) in support of its provincial research organization: in 1983-84, the Alberta Research Council received $35 million in Provincial Government grants and contracts. Industry was the primary external performer, receiving $44 million (23 percent of the Alberta Government's science expenditure) in 1983-84 (Table 9).

The Alberta Oil Sands Technology Research Authority was the primary contributor to the industrial sector in 1983-84. Together with the Department of Agriculture, AOSTRA was also a major contributor to the university sector. Science expenditures in hospitals and health organizations were accounted for almost exclusively by the Department of Hospitals and Medical Care (Appendix A, Table 8).

While the Alberta Government conducts most of its own related scientific activities, only one-fifth of the research and development it funds is performed in-house (Appendix A, Table 7). Alberta Agriculture, Alberta Environment, the Environmental Centre, and the Department of Energy and Natural Resources were major performers of research and development in 1983-84 (Appendix A, Table 9).

5. APPLICATION

Compared with other provincial governments, the Alberta Government supports a greater share of scientific activities in the area of energy and fuels ($53 million or 28 percent of 1983-84 science expenditures). In 1983-84, equal emphasis was placed on activities related to industrial and economic development ($51 million or 27 percent of science expenditures). Nearly half (46 percent) of the support for industrial and economic development was directed toward activities related to agriculture (Table 10; Appendix A, Table 11).

TABLE 10

EXPENDITURES ON SCIENTIFIC ACTIVITIES OF SELECTED PROVINCIAL GOVERNMENTS BY APPLICATION 1983-84

	Governments $ Millions (%)							
Application	**Alberta**		**Ontario**		**Saskatchewan**		**British Columbia**	
Advancement of Science	9	(5)	14	(6)	1	(1)	1	(2)
Energy and Fuels	53	(28)	25	(10)	5	(13)	6	(9)
Environmental Issues	21	(11)	33	(13)	2	(4)	7	(11)
Health	29	(15)	37	(15)	10	(23)	5	(9)
Industrial and Economic Development	51	(27)	84	(33)	16	(39)	30	(49)
Social Development and Related Areas	22	(12)	52	(21)	6	(15)	11	(18)
Transportation and Communications	4	(2)	8	(3)	2	(4)	1	(2)
Total	189	(100)	254	(100)	42	(100)	62	(100)

Source: Statistics Canada, annual surveys of scientific activities of articipating provinces, 1983-84.

SECTION III
OVERVIEW OF RESEARCH AND SCIENCE IN ALBERTA

1. INTRODUCTION[1]

Research and development involves significant transfers of resources between units, organizations and sectors, especially between governments and other performers. The statistical sections of this report have portrayed the exchange of funds at the sectoral level. However, since the data are restricted to aggregated figures, it is difficult to present a complete picture of individual organizations.

The last section of the report, therefore, provides an overview of specific activities of various research units and organizations in the Province. **It is not an exhaustive listing of research funding and performing bodies in Alberta, but should be a representative survey of ongoing research activity.** Hopefully, this additional information will afford the reader a clearer understanding of the intricate network of research support that has evolved in the Province over the past few years.

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[1] Assistance with portions of Section III has been provided by the Office of Science and Technology of the Alberta Research Council, and by Alberta Economic Development.

2. GOVERNMENT OF ALBERTA

There are two aspects to the involvement of the Alberta Government in research and science. The first is the provision of programs in support of research in other performing sectors (extramural activity). The second is the ongoing activity of its departments and agencies whose mandates include research (intramural activity).

2.1 Extramural Support

Through various programs and agencies, the Alberta Government provides research support to universities, private industry, or to qualified individuals. Research assistance is available through:

Alberta Oil Sands Technology and Research Authority (AOSTRA). Established in 1975, AOSTRA is funded through the Alberta Heritage Savings Trust Fund and provides financial support to private firms and research institutions. Objectives are to develop economically viable and environmentally acceptable petroleum technology in areas related to oil sands, heavy oil and enhanced recovery of conventional oil. Research projects consist primarily of field projects with industry that are handled on a shared cost or cost recovery basis.

Alberta/Canada Energy Resources Research Fund (A/CERRF). As a result of the 1974 oil pricing agreement between the Federal Government and the producing provinces, the Federal Government committed $96 million to Alberta in support of energy-related research. Administered by Alberta Energy and Natural Resources, the fund supports research in the areas of: coal; conventional energy resources; energy conservation and renewable energy; and related capital projects.

Alberta Heritage Foundation for Medical Research (AHFMR). The AHFMR was created in 1979 to establish and support a balanced long-term program of medical research based in Alberta. Using the interest revenue generated from a $300 million endowment from the Alberta Heritage Savings Trust Fund, the Foundation supports researchers in the basic medical and clinical sciences, as well as in a broad spectrum of medical related disciplines.

Farming for the Future. An agricultural research program financed through the Alberta Heritage Savings Trust Fund, Farming for the Future was established to support the advancement of agricultural technology by initiating or augmenting research efforts by private industry, universities and government agencies.

Alberta Foundation for Nursing Research. The Foundation was established in 1982 to administer funds over five years to help nurses undertake research for the purpose of improving nursing practice.

Applied Cancer Research Fund. Established in 1977, this program will run until March, 1987 to provide funds for facilities, equipment, and operating expenses associated with applied research at specialized cancer referral centres.

Occupational Health and Safety Heritage Grant Program. This program was established in 1981 to support research and education designed to prevent accidents and ill health resulting from employment, and to promote the health of Alberta workers through improved working conditions.

2.2 Intramural Activities

In addition to its support of research activity in other performing sectors, the Alberta Government conducts research in its own labs and research facilities:

The Alberta Research Council (ARC). Located in Edmonton, with offices in Calgary, Devon, Red Deer, Nisku and Lethbridge, the ARC is Canada's oldest and largest provincial research organization. Six major research programs have been developed in the areas of: natural resources; oil sands; coal; industrial and engineering research; advanced technologies; and the applied sciences (including hydrocarbon upgrading, biotechnology and computing).

Alberta Agriculture. In-house research facilities of the Department of Agriculture include:

> Food Processing Development Centre. This new facility in Leduc is available to food processors who use Alberta products and want to develop new processes or products or to improve existing ones.
>
> Alberta Horticultural Research Centre. Located in Brooks, this centre conducts research for southern Alberta and participates in research for other parts of the Province in all aspects of crop production.
>
> Regional Crops Laboratories. These laboratories, located at Brooks and Olds, study weeds, plant diseases and insect pests. The Olds lab is also involved in Alberta's seed potato improvement program. Both work closely with the Alberta Environmental Centre in Vegreville.
>
> O.S. Longman Building. Laboratories at this Edmonton facility are involved in soil and feed testing, food analyses and product development. Work also centres around plant diseases, insect and animal pests, veterinary pathology and other veterinary medicine needs.
>
> Other facilities and programs. Alberta Agriculture carries out research in Lethbridge in the area of irrigation systems, water use efficiency and other aspects of irrigation management, and is involved in weather modification research in cooperation with the Alberta Research Council. The department operates the Field Unit at Lacombe and veterinary laboratories at Airdrie, Edmonton, Fairview and Lethbridge.

Alberta Environment. The Research Management Division of Alberta Environment is responsible for administering research pertinent to departmental needs on environmental matters, including the identification and implementation of long-term environmental research programs. Over the past few years the department has been involved in projects addressing a diverse range of environmental issues, including the study of acid forming emissions, reclamation research, waste management, and factors affecting human-biophysical environmental relationships.

Alberta Environmental Centre. Situated in Vegreville, the Centre is responsible for studying environmental problems identified by Provincial Government departments and agencies. It is Canada's first interdepartmental, interdisciplinary environmental research and service agency, focusing on applied research and development and the provision of analytical and laboratory services.

Eight research program areas have been established: analytical, diagnostic, extension and technical services; pest management; water/wastewater; environmental toxicology; living natural resources; waste management; and land resources management.

Energy and Natural Resources. Five units of Alberta Energy and Natural Resources report responsibilities in the area of research and science.

Public Lands. This division conducts field investigations and inventories in order to examine such areas as soil characteristics, physical features and natural flora. The division also provides the public with technical support in the area of range management.

Fish and Wildlife. This division conducts research into ecological and physiological variables affecting Alberta's fish and wildlife populations. The division has also been involved in the development of various methodologies of collecting, analyzing, or mapping data in order to describe the fish and wildlife resources of the Province.

Resource Evaluation and Planning. The branch conducts technical surveys for evaluation of environmental parameters, including soils, vegetation, forest productivity, ecological relationships and climate.

Alberta Forest Service (AFS). The AFS conducts in-house research in the area of forest land management and provides research support to the Alberta forest products industry through its Forest Products and Forest Industrial Development Research Program. Alberta also has one of the finest forest genetics programs in North America, a joint effort of the AFS, industry and Alberta universities.

Scientific and Engineering Services. This division is responsible for overseeing a large volume of research and development, funded primarily through A/CERRF (see Section 2.1). Projects relate to furthering the development and use of energy resources, with emphasis on coal, renewables and energy conservation. Alberta's coal research capability has been greatly enhanced by the construction of a new research facility, built under the auspices of A/CERRF:

> Coal Research Centre, Devon. This new facility accommodates the research operation of the Alberta Research Council's Coal Program, the federal Coal Research Laboratory, and a private organization, the Coal Mining Research Centre. Thus, three major centres of Western Canadian coal research are housed under one roof, facilitating interaction and coordination of effort.

3. THE FEDERAL GOVERNMENT

Over 60 federal departments and agencies either perform scientific activity or have the budgetary allocation to fund such activity. Following are descriptions of selected federal programs and facilities pertinent to Alberta.

3.1 Extramural Support

Several agencies of the Federal Government offer programs in support of scientific activity in the university and industrial sectors:

Natural Sciences and Engineering Research Council of Canada (NSERC). This federal granting agency is a principal funder of university research in the natural sciences and engineering. Support is offered in the form of research grants, manpower awards, development grants and research infrastructure support.

Social Sciences and Humanities Research Council of Canada (SSHRC). Supporting research in fields as diverse as archaeology, transportation and social history, SSHRC offers universities funding for research support, training and communication.

Medical Research Council of Canada (MRC). The MRC provides grants to help defray the costs of basic, applied, experimental, or clinical research; provides salary support to a limited number of investigators and research trainees in Canadian universities; and sponsors programs to help develop research in fields where major contributions may be expected.

National Research Council Canada

> Industrial Research Assistance Program (IRAP). Administered locally by Alberta Research Council, this program is designed to enhance the commercial capabilities of companies by providing support to researchers engaged in industrial projects of high technical merit with prospects of high return.

Program for Industry/Laboratory Projects (PILP). Companies with sufficient technical and business capability to commercialize approved research project results are eligible for PILP support. The program involves the provision of access to science-based government laboratories and departments, and the technical assistance of their experts.

Department of Regional Industrial Expansion

Industrial and Regional Development Program (IRDP). This program provides support to projects at various stages of innovation and development.

Defence Industry Productivity Program (DIPP). DIPP is designed to enhance the technological competence of the defence industry in its export activities by providing assistance to industrial firms for selected projects.

3.2 Intramural Activities

The Federal Government's in-house research facilities in the Province include:

Agricultural Research Station, Lethbridge. The offices, laboratories and library of the Research Station form the major part of the complex known as the Agriculture Centre. The Centre also houses offices of Alberta Agriculture, representing a coordinated effort to serve agricultural research needs in one location. The station employs scientists working in six disciplinary areas: soil science, plant science, crop entomology, plant pathology, animal science, and animal parasitology.

Institute of Sedimentary and Petroleum Geology (ISPG). Adjacent to the University of Calgary, the ISPG serves government, industry and the scientific community in the provision of geological information. The Institute studies the sedimentary basins of western and northern Canada, focusing on bedrock geology, paleontology, and the assessment of coal, oil and gas resources.

Northern Forest Research Centre. This centre, located in Edmonton, is responsible for fulfilling the federal role in forestry research, development and technology transfer in Alberta, Saskatchewan, Manitoba and the Northwest Territories. Research is organized under three programs: environmental forestry; forest resources research (such as forest improvement and management); and forest protection.

Defence Research Establishment - Suffield (DRES). Located in Ralston, Alberta, DRES conducts basic and applied research on medical and chemical aspects of chemical defence, microbiology, chemical and biological defence training, military engineering applications and the disposal of hazardous and toxic materials.

Coal Research Laboratory (CRL). At the forefront of coal research and technology conducted by Energy, Mines and Resources Canada is the Coal Research Laboratory based in the Devon Coal Research Centre. The CRL has served the Western Canadian coal industry for more than thirty years. Activity centres around four research areas: preparation of coal for the marketplace; effective means of water treatment; coal carbonization; and oil - water emulsion techniques.

4. THE PRIVATE SECTOR

Industrial research aimed at developing Alberta's natural resources has spawned an extensive support base of related industries, including firms involved in petrochemical, seismic, telecommunications, computer processing and medical technology. The following section highlights some of these related industries, many of which have evolved technological applications in a broad range of research areas. The list is not intended to include all research performing units in the Province, but should be a representative survey of ongoing research activity in these emerging technologies.[1]

Global Thermoelectric Power Systems Ltd. is one of the companies in the Province exploring alternate power sources. Global researchers have developed a remote power system which burns gaseous fuels, converting them directly to electric power. Global is one of only two manufacturers in the world producing thermoelectric generators.

Canadian General Electric established its R&D Energy and Resources operation in Edmonton in 1981 as part of its strategic plan to diversify into the resource sector. One of the projects now under way involves modifying GE's hydraulic remote manipulator (Man-Mate) for use in the energy industry.

INTERA Technologies Ltd. has adapted a Synthetic Aperture Radar system (STAR 1) for generating images mounted on small aircraft for commercial use. The system has found wide application in advising Arctic drilling and navigation projects of ice movement in northern waters.

Nortech Surveys (Canada) Ltd., also involved in navigational high technology, supervises extensive applied research and development programs with applications for resource-based industries, including energy and forestry. In addition, the company is currently developing a computer-based navigational system linked to satellite rather than ground signals, permitting the use of less expensive fixed-wing aircraft instead of helicopters.

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[1] Major petroleum recovery industries with research units in Alberta are not included in this summary. Although they account for the majority of industrial research and development expenditures in the Province, their activities are well documented elsewhere. See for example, Statistics Canada, Directory of Industrial Research and Development Facilities in Canada, 1985, Minister of Supply and Services Canada, 1985.

Geotechnical Resources Ltd. develops and applies new technology to a range of sophisticated lab and testing services for the exploration and development sectors of the petroleum industry in Western Canada, the Arctic and abroad. Geotech has diversified into areas related to its rock core, gas and fluids analysis services.

Sherritt Gordon Mines Ltd. operates a large nickel and cobalt refinery at Fort Saskatchewan. All of the processes in use at the Sherritt plant have been developed by its research organization over the past 30 years.

Vandore Enterprises Ltd. is currently in the final phase of research and development prior to construction of a $12 million to $15 million vanadium extraction plant. Vanadium production could emerge as a key secondary oil sands industry in the next several years.

Dow Chemical Canada manufactures a variety of industrial chemical products, and operates a chemical research facility in association with its plant in Fort Saskatchewan.

Raylo Chemicals Ltd. and Terochem Laboratories Ltd. are producers of high technology specialty chemicals. Recently, the companies have entered into the aerospace plastics business and have specialty high polymers in the experimental stage. The companies are also looking into ways of manufacturing DNA derivatives which can be used in genetic engineering.

NOVA, an Alberta Corporation is active in gas transportation and marketing, petroleum, petrochemicals, manufacturing and research. Two major projects were emphasized in 1984. Objectives of the first project were to provide the gas control computer system with superior control capability, and to make additional capacity available. The second project involved a computerized measurement system to incorporate innovative design functions developed by NOVA.

Digitech Ltd. is involved in advanced digital processing of seismic data. One of its current projects is the transfer of Digitech software into interactive graphic work stations allowing greater data access to exploration geologists in the field. Prototypes of this data-based digital processing system are already in use and represent one of many innovations revolutionizing the seismic industry in Alberta.

Sefel Geophysical Ltd. is undertaking extensive research and development through the Sefel Research Corporation. In 1984, Sefel installed super-array computer hardware at its research centre that will be central to a new development program aimed at three dimensional navigation and seismic systems.

Teknica Resources Development Ltd., also serving the seismic industry, is an established firm that has pioneered the use of computer imaging techniques for geophysical interpretation.

Bell Northern Research Ltd. has extensive laboratory facilities in Alberta. The company places a major emphasis on fibre optic research and related transmission product development. Research extends to areas including high-capacity fibre optics transmission for long-haul voice telecommunication, fibre optics transmission between metropolitan offices and fibre optic installation equipment.

Novatel Communications Ltd. developed the first cellular phone system in North America, AURORA, which went into commercial operation in 1983. The AURORA telecommunications system links microprocessor capabilities with a state-of-the-art computer based control, representing one of the most sophisticated mobile phone systems in the world.

Idacom Electronics Ltd. designs and manufactures telecommunications test equipment and develops the software to run it. The company is alone in providing a reference and test tool for a seven layer communications protocol.

EDO Corporation designs and manufactures advanced electronics and specialized equipment for military, aviation and industrial markets. The Fibre Science Division was awarded a contract by Beech Aircraft Corporation for the manufacture of prototype composite structures for Starship I, a new advanced corporate aircraft.

Caulfield Engineering developed the world's first stereo sidescan sonar system, the Acoustic Core, to measure ocean depth. It takes readings on either side of a vessel's path within a swath of 50 meters and has been used for construction of artificial drilling islands in the Arctic.

Harding Instruments Company Ltd. One of Harding's newest products is the two-line key telephone system designed for use in small businesses or residences.

Niart International Inc. designs, manufactures, installs and maintains traffic control products including signal heads, controllers/cabinet assemblies and computerized traffic control systems. This new company is jointly owned by Niart Inc., Vencap Equities Alberta Ltd., and Canadian General Electric of Toronto. The company's research activities focus on research and development of solid state electronics and the creation of major software systems.

D.B. Robinson and Associates operates a state-of-the-art experimental research lab doing contract work in fluid properties and phase behaviour, and in specialized computer software development for hauling oil and gas.

Robertson Photogrammetric Inc. employs photographic techniques coupled with electronic scanning and computer programs to do jobs ranging from detecting minute changes on the wing surfaces of F-18 and F-20 fighters to mineral survey work.

Myrias Research Corporation, a young Alberta company, has designed and is building what may prove to be the fastest and most powerful supercomputer in the world. The Myrias 4000, a unit comprised of 4 096 Motorola 68000 microprocessors, will simultaneously perform a record number of functions.

Synerlogic Inc. is presently promoting its "Act 1" system, a software program that enables professional computer programmers to build an architectural model or blueprint of a planned project.

Keyword Office Technologies Ltd. The Calgary based company recently announced new software modules for its disk-to-disk document interchange system, the KEYWORD 7000. Keyword currently supplies 200 software products that make information exchange possible between different brands of word processors and personal computers.

Willowglen Systems Ltd. is a competitor in the international marketplace with its exclusive Supervisory Control and Data Acquisition (SCADA) system. "SCADA" is the only remote computerized control system of its kind in Canada.

Computalog Gearhart Ltd. provides the oil industry with specialized services such as open-hole logging and measurement while drilling directional wells. The open-hole logging procedure uses sophisticated electronic instruments to measure various characteristics of geological formations such as depth, cleanliness, porosity and fluid content.

Chembiomed Ltd., a company owned by the University of Alberta, has developed the technology to chemically produce blood purifiers and manufacture blood typing reagents using cloned cells from mice.

Bio Logicals Inc. is currently involved in a joint venture genetic engineering project with the Alberta Research Council aimed at the development of pharmaceuticals and specialty chemicals.

Summa Biomedical Canada Ltd. Summa scientists are working in a unique collaborative venture with the University of Alberta to develop blood tests designed for routine use with groups susceptible to certain cancers.

5. THE UNIVERSITY SECTOR

Alberta's three major universities train skilled researchers in all fields of art and science, and work closely with industry and government on basic and applied problems in research and development.

The following description focuses on the activities of faculties who report receipts of research funds from outside agencies: it should be borne in mind, however, that sponsored research constitutes only a portion of on campus research and scholarship. Numerous studies requiring only the institution's existing resources and the investigator's scholarly reflection are conducted in virtually every university department.

University of Alberta. The University of Alberta in Edmonton is the Province's oldest and largest research performing institution. The University gears its industrial laboratory research towards Alberta's current economic base in agriculture, oil and gas; to resource areas of future significance in forestry and coal; to new product development in fields such as pharmaceuticals and engineering design technology; and to the application of new technology in existing industrial systems through microelectronics and other areas on the leading edge of international developments.

Recent research initiatives at the University of Alberta include:

Alberta Microelectronics Centre. Partially supported by a $13 million allocation from the Alberta Government, the Centre will expand to house silicon microchip design facilities in Calgary and fabrication facilities at the University of Alberta.

Alberta Telecommunications Research Centre. Jointly operated by Bell Northern Research and the University of Alberta, the Centre will promote research in fibre optics, optoelectronics and related areas.

Alberta Agricultural Research Institute. A joint enterprise of the University of Alberta and Alberta Agriculture, the Institute will conduct basic and applied research on agricultural problems.

Canadian Pacific (C.P.) Research Program. C.P., together with McGill University, and the Universities of Manitoba, Saskatchewan and Alberta, has created a consortium to conduct a five year program of biotechnological research into problems of Western Canadian agriculture.

Alberta Laser Institute. Governed by a Board of Directors with strong industrial representation, the Institute will specialize in laser research related to robotics, manufacturing, and microchip processing.

Centre for Frontier Engineering Research. Established as a joint venture with several private firms, the Devonian Foundation and the University, the Centre deals with specialized research and development in cold regions products.

University of Calgary. This relatively young university is earning an impressive reputation for attracting outside research support. The Faculties of Medicine, Engineering and Science account for most of the grants and contracts, and encompass nine major medical research groups in areas ranging from genetic engineering to cell regulation and behavioral sciences. There are leading programs in survey, chemical and petroleum, civil and electrical engineering. Basic research in chemistry and biotechnology bears application to agriculture and forestry, and university researchers have been involved in major environmental projects. Petroleum related research includes an institute of sulphur chemistry, investigations of oil sands bitumen, basic studies of geological phenomena related to enhanced oil recovery, and a large scale geophysical (seismic) project. Other emerging research strengths at the University are related to intensive computer software development, a VLSI design facility, mathematical interpolation methods for representation of digital data, and satellite imaging techniques.

Particular research strengths at the University of Calgary include:

Alberta Microelectronics Centre. Expansion of the Centre from Edmonton, to include silicon microchip design facilities at the University of Calgary.

Supercomputer Facilities. Acquisition of the CYBER 205 supercomputer, one of only four supercomputers in North American universities. Wide ranging applications in complex problem solving will increase research potential in industry, government, and the university research community.

JADE. The JADE project is directed at developing programs for a network of heterogeneous computers and terminals for future business, professional, and educational information systems.

Institute for Transportation Studies. This established research institute is an interdisciplinary organization, carrying out projects related to urban transportation, air transportation, and tourism.

Alberta Sulphur Research Institute. The Institute acts as a research and training bridge between industry and academia, investigating problems in the production, handling, transportation, and use of elemental sulphur.

Canadian Centre for Learning Systems (CCLS). This non-profit organization involves Calgary's five educational institutions, the Federal Government, and several private firms. Objectives of the CCLS are to develop and evaluate the use of learning systems at all levels of education.

University of Lethbridge. Providing post-secondary education to Albertans at the undergraduate level, the University of Lethbridge maintains a significant research budget. Research at the University includes: individual projects on the environmental effects of oil sands plants; development processes in poplar and maize; animal parasites in water systems; aspects of neuropsychology; and perceptual problems in infants.

Appendix A

SCIENTIFIC ACTIVITIES OF THE GOVERNMENT OF ALBERTA
1983-84 SURVEY RESULTS

A REPORT PREPARED BY:

THE SCIENCE AND TECHNOLOGY STATISTICS DIVISION
STATISTICS CANADA

OCTOBER, 1984

Revised May, 1985

FOREWORD

This report results from the eleventh annual survey of scientific activities funded by the Government of Alberta. The survey was conducted in May of 1984 by Rose Krakower and Bert Plaus of the Science and Technology Statistics Division, Statistics Canada, with the co-operation and assistance of Asefa Gabregiorgis of Advanced Education, and Onno DeVries and Barbara Avery of the Alberta Bureau of Statistics.

Scientific activities data of provincial governments provide an essential base for analysis and the formulation of provincial science policy. As increasing amounts are spent by these governments (Alberta expenditures have grown by more than 300% in the last six years), monitoring and guidance of science programs become more important.

The first surveys of government scientific activities at the provincial level were conducted in the provinces of Ontario, Alberta and Nova Scotia in 1974; Saskatchewan was included in 1975, British Columbia in 1977 and New Brunswick in 1984. Reports for other provinces, similar to this one are available on request from the representatives identified at the end of this report.

Surveys of the scientific activities of provincial governments serve several purposes. They provide data for the development of a national aggregate R&D series. National aggregates are published by Statistics Canada in many of the publications listed at the end of this report. The national aggregates are also needed to complete the international questionnaires for the Organization for Economic Co-operation and Development (OECD) and the United Nations Education, Science and Culture Organization (UNESCO).

The 1983-84 survey has produced reasonable indicators of scientific involvement of the Alberta government at the department or agency level. This success is largely due to the goodwill and efforts of officials of the responding departments. The assistance provided by the Alberta Bureau of Statistics and Alberta Advanced Education is gratefully acknowledged and appreciated by Statistics Canada.

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Total Expenditures:						
by Activity and Performer	14	38	34	68	54	94
by Department and Performer	15	39	35	69	55	95
Current Expenditures on R&D by Department and Performer	16	41	36	70	56	96
Application of Expenditures:						
by Department	17	42	37	71	57	97
by Activity	18	48	38	74	58	100
Extramural R&D Expenditures by Sector of Performance and Application	19	49	39	75	59	101
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The following symbols are used in this report:

- nil or zero
(e) estimated by Statistics Canada
.. figures not available
... figures not appropriate or not applicable
-- too small to be expressed

SUMMARY

Total expenditures by the province of Alberta on scientific activities have increased from 1977-78 to 1984-85 on the average of 21% per annum. The increase for 1983-84 is $8 million or 9%. An increase of 18%, ($33 million) is anticipated for 1984-85. The major spenders are shown in Figure II.

Figure I Total Expenditures on Scientific Activities, by Science Type, 1977-78 to 1984-85(e)

Year	Natural sciences			Social sciences			Total		
	R&D	RSA	Total	R&D	RSA	Total	R&D	RSA	Total
	($'000)								
1977-78	41,254	8,908	50,162	2,070	12,787	14,857	43,324	21,695	65,019
1978-79	59,813	7,818	67,631	3,083	11,881	14,964	62,896	19,699	82,595
1979-80	79,533	13,530	93,063	3,721	13,557	17,278	83,254	27,087	110,341
1980-81	76,841	17,832	94,673	2,443	17,674	20,117	79,284	35,506	114,790
1981-82	92,477	31,873	124,350	2,268	25,643	27,911	94,745	57,516	152,261
1982-83	115,382	28,466	143,848	1,714	27,599	29,313	117,096	56,065	173,161
1983-84	126,156	32,915	159,071	2,468	27,701	30,169	128,624	60,616	189,240
1984-85(e)	157,331	34,377	191,708	2,687	28,181	30,868	160,018	62,558	222,576

Of the total 1983-84 science expenditures, amounting to $189 million, 84% ($159 million) is for activities in the natural sciences. Total research and development expenditures account for 68% ($129 million). The proportion of research and development expenditures to total science expenditures in the natural sciences is 79% ($126 million) in contrast with the proportion in the social sciences of 8% ($2 million).

Figure II Total Expenditures on Scientific Activities, by Major Department, 1982-83 and 1983-84

Major Department or Agency	1982-83	1983-84	Percentage change over 1982-83
	($'000)		%
Agriculture	16,391	19,532	19
Energy and Natural Resources	25,210	28,509	13
Environment	9,687	13,643	41
Environmental Centre	10,528	11,605	10
AOSTRA	41,105	40,639	--
Hospitals and Medical Care	19,502	22,253	14
Sub-total	122,423	136,181	11
Other	50,738	53,059	5
Total	173,161	189,240	9

Figure III shows that the continued increase in current R&D expenditures in the natural sciences is maintained by 3 departments or agencies. AOSTRA, which in 1983-84 accounts for 35% ($41 million), anticipates an expenditure of $74 million in 1984-85.

Figure III **Current Expenditures on R&D in the Natural Sciences, 1977-78 to 1984-85(e)**

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
AOSTRA	18,126	32,177	40,077	30,960	35,305	41,066	40,586	72,622
Executive Council(1)	...	8,209	9,153	11,561	15,500	19,148	19,950	21,463
Hospitals and Medical Care	1,848	4,517	11,846	12,138	12,942	16,865	19,769	20,992
Other	20,690	12,529	17,077	20,774	26,801	30,283	34,442	37,900
Total R&D	40,664	57,432	78,153	75,433	90,548	107,362	114,747	152,977

(1) Vote 6 to Alberta Research Council.

While the Alberta government carries out most of its own RSA, only approximately 20% of the R&D funded is performed intramurally. Agriculture, Energy and Natural Resources, and the Environmental Centre are the major performers.

Figure IV Total Expenditures on Scientific Activities, by Sector of Performance, 1983-84

Activity	Intramural	Industry	University	Hospitals and health organizations	Alberta Research Council(1)	Other	Total
	($'000)						
R&D	27,411	32,207	13,617	16,646	33,370	5,373	128,624
RSA	43,439	10,781	946	65	1,673	3,712	60,616
Total	70,850	42,988	14,563	16,711	35,043	9,085	189,240

(1) Annual funding by the Government of Alberta - Other funds are not included.

Of the $43 million of provincial funds allocated to the industrial sector, $32 million (75%) is devoted to R&D. AOSTRA is the major contributor to this sector, accounting for 65% or $28 million. AOSTRA and Agriculture are the prime funders of the university sector, together accounting for 51% of the $15 million funded, $14 million of which is devoted to R&D.

The Department of Hospitals and Medical Care contributed $17 million to the hospitals and health organizations for medical research. The Alberta Research Council received its funds from six provincial departments in 1983-84. The largest source is the Executive Council for an amount of $20 million.

Figure V Total Expenditures on Scientific Activities by Sector of Performance and by Major Department, 1983-84

Department or Agency	Intramural	Industry	University	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Agriculture	8,294	493	3,484	-	4,071	3,190	19,532
Energy and Natural Resources	18,618	3,602	1,281	-	4,899	109	28,509
Environment	8,804	2,535	693	55	600	956	13,643
Environment Centre	11,570	-	-	-	-	35	11,605
Executive Council	-	-	-	-	19,950	-	19,950
Hospitals and Medical Care	1,647	-	2,504	16,544	-	1,558	22,253
AOSTRA	2,921	27,575	3,999	-	5,086	1,058	40,639
Other	18,996	8,783	2,602	112	437	2,179	33,109
Total	70,850	42,988	14,563	16,711	35,043	9,085	189,240

Figure VI Total Expenditures on Scientific Activities, by Source of Funds and by Major Department, 1983-84

Department or Agency	Departmental budget	Transfer from other departments	Trust fund	Other sources	Total
	($'000)				
Agriculture	11,678	-	7,854	-	19,532
Energy and Natural Resources	11,777	-	-	16,732	28,509
Environment	13,348	-	295	-	13,643
Environment Centre	11,539	66	-	-	11,605
Executive Council	19,950	-	-	-	19,950
Hospitals and Medical Care	18,010	4	4,239	-	22,253
AOSTRA	2,921	-	37,718	-	40,639
Other	30,709	1,137	397	866	33,109
Total	**119,932**	**1,207**	**50,503**	**17,598**	**189,240**
%	63	1	27	9	100

The primary source of funds for scientific activities is the provincial departmental budgets, which fund 63% of total science expenditures. The Alberta Heritage Savings Trust Fund is the source of 93% of AOSTRA's science expenditures. In total, the Fund is the source of 27% of the 1983-84 science expenditure.

Other sources include the federal-provincial cost shared programs of $17.6 million.

Figure VII Application of Total Expenditures, 1983-84

Application	Natural sciences	Social sciences	Total
		($'000)	
Energy and fuels	52,989	-	52,989
Environmental issues	19,052	1,654	20,706
Health	25,250	4,075	29,325
Industrial and economic issues	47,513	3,313	50,826
Social development and related areas	2,336	19,691	22,027
Transportation	2,587	1,281	3,868
All other	9,344	155	9,499
Total	**159,071**	**30,169**	**189,240**

The major applications of scientific expenditures by the Alberta government are shown in Figure VII. Two main application areas, energy and fuels and industrial and economic issues, account for 55% of the total scientific expenditures. The major departments or agencies supporting these applications are AOSTRA, Energy and Natural Resources and Agriculture.

The application with the largest expenditure in the social sciences is social development and related areas. Culture, Education and Solicitor General are the main supporters of this application.

Person-years involved in scientific activities total 1,519. Categories identified are scientific and professional, technical and other. The scientific and professional category is the largest with 49% of the total. Technical and other categories comprise 34% and 17% respectively.

Figure VIII Departmental Personnel Engaged in Intramural Activities, by Science Type and Category, 1983-84

Science type and activity	Scientific and professional	Technical	Other	Total
	(person-years)			
Natural sciences:				
R&D	159	137	52	348
RSA	274	326	65	665
Total	433	463	117	1,013
Social sciences:				
R&D	16	-	5	21
RSA	298	56	131	485
Total	314	56	136	506
Total	**747**	**519**	**253**	**1,519**

The Environmental Centre employs 23% of the total 1,009 people working in the natural sciences while 29% work in Department of Agriculture.

Natural plus Social Sciences and Humanities

Government of Alberta

TABLE 1. Total Expenditures, by Activity, 1977-78 to 1984-85(e)

Activity	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Research and development:								
Current expenditures:								
In-house	3,971	2,648	5,652	7,488	11,825	14,751	15,785	16,912
Contracts	20,490	38,018	48,722	39,559	47,156	51,969	46,658	83,241
Grants	18,119	19,734	27,294	30,704	33,561	42,040	54,267	55,136
Research fellowships	152	112	202	112	271	306	503	375
Sub-total	42,732	60,512	81,870	77,863	92,813	109,066	117,213	155,664
Capital expenditures	592	2,384	1,384	1,421	1,932	8,030	11,411	4,354
Related scientific activities:								
Current expenditures	21,565	19,439	26,477	34,786	55,765	54,038	58,717	60,702
Capital expenditures	130	260	610	720	1,751	2,027	1,899	1,856
Total	**65,019**	**82,595**	**110,341**	**114,790**	**152,261**	**173,161**	**189,240**	**222,576**

Government of Alberta

TABLE 2. Total Expenditures, by Department or Agency, 1977-78 to 1984-85(e)

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Advanced Education	...	...	...	...	...	...	1,354	1,723
Advanced Education & Manpower	834	2,408	2,075	1,920	2,344	2,612	...	...
Agricultural Research Trust ..	...	461	472	389	395	373	369	394
Agriculture	3,750	3,500	4,656	7,130	14,978	16,391	19,532	19,526
Alcoholism & Drug Abuse Commission	232	248	282	375	497	264	320	290
Attorney General	299	238	260	290	290	290	436	407
Business Development & Tourism	10,766	...	...	...	...	...	...	...
Consumer & Corporate Affairs .	90	62	75	89	120	143	172	167
Culture	3,162(e)	2,111	2,419	2,239	3,318(e)	2,833	3,834	3,913
Economic Development	...	2,117	3,125	3,484	5,857	4,093	3,374	3,400
Education	1,450	1,932	2,114	2,414	3,050	3,617(e)	2,724	3,479
Educational Communications Corporation ACCESS	-	263	215	165	182(e)	200(e)	398	405
Energy & Natural Resources ...	5,185	9,140	12,819	14,274	20,630	25,210	28,509	26,090
Environment	8,634	5,886	10,911	11,902	12,268	9,687	13,643	14,038
Environmental Centre	...	...	-	3,168	7,441	10,528	11,605	11,780
Environment Council	788	930	788	1,289	1,321	1,243	1,525	1,339
Executive Council	...	8,209	9,153	11,561	15,500	19,148	19,950	21,463
Hospitals & Medical Care	3,205	5,659	12,876	13,930	15,033	19,502	22,253	24,485
Housing & Public Works	975	390	420	324	480	805	1,206	1,619

Government of Alberta

TABLE 2. Total Expenditures, by Department or Agency, 1977-78 to 1984-85(e) - Concluded

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Labour	435	529	646	693	887	1,105	1,847	996
Manpower	...	...	...	...	...	...	1,539	1,534
Mental Health Research Fund ..	...	182	230	478	360	386	754	754
Municipal Affairs(1)	125	399	258	364	1,184	1,408	1,577	1,677
AOSTRA	18,737	32,746	40,195	30,988	35,335	41,105	40,639	72,647
Recreation & Parks	...	--	580	578	910	940	535	385
Recreation, Parks & Wildlife	1,171(e)	...	...	...	...	...	...	...
Social Services & Community Health	725	535	630	733	933	100	270	290
Solicitor General	267	257	35	183	1,754	3,478	4,434	3,000
Tourism & Small Business	...	517	1,046	1,451	1,246	1,597	1,058	1,060
Transportation	2,564	1,888	1,811	1,932	3,050	3,262	2,964	2,518
Treasury	1,625	1,161	1,426	1,868	2,085	1,994	2,097	2,155
Workers' Compensation Board ..	-	165	-	-	-	-	-	-
Workers' Health, Safety & Compensation	...	662	824	579	813	847	1,122	1,042
Total	**65,019**	**82,595**	**110,341**	**114,790**	**152,261**	**173,161**	**189,240**	**222,576**

(1) Revisions available only as of 1981-82.

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TABLE 3. Total Expenditures, by Performer, 1977-78 to 1984-85(e)

Performer	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Intramural	18,839	19,287	26,670	29,556	53,478	61,920	70,850	68,314
Industry	26,146	37,779	47,011	40,831	43,029	44,502	42,988	79,910
Universities	2,138	5,408	6,991	8,070	10,139	17,891	14,563	13,474
Hospitals and health organizations	2,653	5,218	12,330	12,321	12,801	11,191	16,711	18,493
Alberta Research Council(1)	10,741	12,874	14,009	20,589	27,750	32,354	35,043	35,398
Other	4,502	2,029	3,330	3,423	5,064	5,303	9,085	6,987
Total	**65,019**	**82,595**	**110,341**	**114,790**	**152,261**	**173,161**	**189,240**	**222,576**

(1) Annual funding by the Government of Alberta - other funds are not included.

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TABLE 4. Current Expenditures on R&D, by Performer, 1977-78 to 1984-85(e)

Performer	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Intramural	4,227	3,886	6,180	7,625	11,877	14,804	16,000	17,148
Industry	21,228	34,396	42,141	28,754	28,901	32,579	32,207	70,049
Universities	1,931	4,253	6,001	7,037	9,089	16,420	13,617	12,473
Hospitals and health organizations	1,978	4,785	12,075	12,316	12,801	11,191	16,646	18,433
Alberta Research Council(1) ..	10,188	12,175	12,837	19,567	26,684	31,184	33,370	34,097
Other	3,180	1,017	2,636	2,564	3,461	2,888	5,373	3,464
Total	**42,732**	**60,512**	**81,870**	**77,863**	**92,813**	**109,066**	**117,213**	**155,664**

(1) Annual funding by the Government of Alberta - other funds are not included.

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TABLE 5. Current Expenditures on R&D, by Department or Agency, 1977-78 to 1984-85(e)

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Advanced Education	...	...	...	...	...	...	19	65
Advanced Education & Manpower	-	320	550	-	-	-	...	...
Agricultural Research Trust ..	...	461	472	389	395	373	369	394
Agriculture	3,750	3,500	4,656	7,130	10,978	13,699	15,782	13,941
Alcoholism & Drug Abuse Commission	-	57	93	118	7	7	1	1
Attorney General	219	238	260	290	290	290	436	407
Business Development & Tourism	7,534	...	...	...	...	...	...	...
Consumer & Corporate Affairs .	45	-	-	-	-	-	-	-
Culture	261(e)	345	536	377	594(e)	296	773	773
Education	1,020	1,203	1,137	438	381	285(e)	300	383
Educational Communications Corporation ACCESS	-	-	5	5	6(e)	7(e)	-	-
Energy & Natural Resources ...	3,669	4,739	6,193	7,390	9,608	9,521	10,041	15,074
Environment	3,864	2,836	4,811	3,521	3,259	3,481	3,884	3,644
Environmental Centre	...	...	-	1,300	2,157	2,997	3,460	3,527
Executive Council	...	8,209	9,153	11,561	15,500	19,148	19,950	21,463
Hospitals & Medical Care	1,984	4,661	12,073	12,281	13,388	16,976	19,880	21,103
Housing	-	-	-	37	100	385	370	705
Manpower	...	...	...	...	...	...	90	100

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TABLE 5. Current Expenditures on R&D, by Department or Agency, 1977-78 to 1984-85(e) - Concluded

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Mental Health Research Fund ..	...	182	216	478	360	386	754	754
Municipal Affairs(1)	102	322	166	220	105	68	53	12
AOSTRA	18,126	32,177	40,077	30,960	35,305	41,066	40,586	72,622
Recreation & Parks	...	--	-	-	-	-	27	19
Recreation, Parks & Wildlife	449(e)	...	...	...	...	...	...	...
Social Services & Community Health	308	76	84	93	-	-	-	-
Solicitor General	-	-	35	24	-	-	-	-
Tourism & Small Business	...	-	-	79	-	-	-	-
Transportation	1,181	998	1,131	952	272	13	66	305
Treasury	220	35	48	203	61	-	-	-
Workers' Compensation Board ..	-	36	-	-	-	-	-	-
Workers' Health, Safety & Compensation	-	117	174	17	47	68	372	372
Total	42,732	60,512	81,870	77,863	92,813	109,066	117,213	155,664

(1) Revision only available as of 1981-82.

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TABLE 6. Total Expenditures, by Sources of Funds, 1983-84

Department or Agency	Departmental budget	Transfers from other departments	Transfers from federal government	Trust funds	Other sources	Total
	($'000)					
Advanced Education	1,354	-	-	-	-	1,354
Agricultural Research Trust ..	-	250	-	-	119	369
Agriculture	11,678	-	-	7,854	-	19,532
Alcoholism & Drug Abuse Commission	320	-	-	-	-	320
Attorney General	436	-	-	-	-	436
Consumer & Corporate Affairs .	158	14	-	-	-	172
Culture	3,725	101	8	-	-	3,834
Economic Development	3,374	-	-	-	-	3,374
Education	2,655	-	69	-	-	2,724
Educational Communications Corporation ACCESS	380	18	-	-	-	398
Energy & Natural Resources ...	11,777	-	-	-	16,732	28,509
Environment	13,348	-	-	295	-	13,643
Environmental Centre	11,539	66	-	-	-	11,605
Environment Council	1,525	-	-	-	-	1,525
Executive Council	19,950	-	-	-	-	19,950
Hospitals & Medical Care	18,010	4	-	4,239	-	22,253
Housing	1,206	-	-	-	-	1,206

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TABLE 6. Total Expenditures, by Sources of Funds, 1983-84 - Concluded

Department or Agency	Departmental budget	Transfers from other departments	Transfers from federal government	Trust funds	Other sources	Total
	($'000)					
Labour	1,047	-	-	-	-	1,047
Manpower	1,539	-	-	-	-	1,539
Mental Health Research Fund ..		754	-	-	-	754
Municipal Affairs	1,577	-	-	-	-	1,577
AOSTRA	2,921	-	-	37,718	-	40,639
Recreation & Parks	310	-	-	-	225	535
Social Services & Community Health	270	-	-	-	-	270
Solicitor General	4,434	-	-	-	-	4,434
Tourism & Small Business	1,058	-	-	-	-	1,058
Transportation	2,964	-	-	-	-	2,964
Treasury	2,097	-	-	-	-	2,097
Workers' Health, Safety & Compensation	280	-	-	397	445	1,122
Total	**119,932**	**1,207**	**77**	**50,503**	**17,521**	**189,240**

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TABLE 7. Total Expenditures by Activity and Performer, 1983-84

Activity	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Research and development:							
Current expenditures:							
In-house	15,785	-	-	-	-	-	15,785
Contracts	44	31,573	4,467	-	9,344	1,230	46,658
Grants	171	634	8,647	16,646	24,026	4,143	54,267
Research fellowships	-	-	503	-	-	-	503
Sub-total	16,000	32,207	13,617	16,646	33,370	5,373	117,213
Capital expenditures	11,411	-	-	-	-	-	11,411
Related scientific activities:							
Current expenditures	41,540	10,781	946	65	1,673	3,712	58,717
Capital expenditures	1,899	-	-	-	-	-	1,899
Total	**70,850**	**42,988**	**14,563**	**16,711**	**35,043**	**9,085**	**189,240**

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TABLE 8. Total Expenditures by Department or Agency and Performer, 1983-84

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Advanced Education	401	30	626	1	-	296	1,354
Agricultural Research Trust	27	-	342	-	-	-	369
Agriculture	8,294	493	3,484	-	4,071	3,190	19,532
Alcoholism & Drug Abuse Commission	212	108	-	-	-	-	320
Attorney General	-	-	436	-	-	-	436
Consumer & Corporate Affairs	172	-	-	-	-	-	172
Culture	2,594	1,129	-	-	-	111	3,834
Economic Development	1,600	1,774	-	-	-	-	3,374
Education	1,239	770	-	-	5	710	2,724
Educational Communications Corporation ACCESS	274	124	-	-	-	-	398
Energy & Natural Resources	18,618	3,602	1,281	-	4,899	109	28,509
Environment	8,804	2,535	693	55	600	956	13,643
Environmental Centre	11,570	-	-	-	-	35	11,605
Environment Council	1,525	-	-	-	-	-	1,525
Executive Council	-	-	-	-	19,950	-	19,950
Hospitals & Medical Care	1,647	-	2,504	16,544	-	1,558	22,253
Housing	967	235	-	-	-	4	1,206

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TABLE 8. Total Expenditures by Department or Agency and Performer, 1983-84 - Concluded

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Labour	962	-	-	-	-	85	1,047
Manpower	1,420	115	4	-	-	-	1,539
Mental Health Research Fund	-	-	640	101	-	13	754
Municipal Affairs	1,351	149	-	-	-	77	1,577
AOSTRA	2,921	27,575	3,999	-	1,058	1,058	40,639
Recreation & Parks	208	135	169	-	-	23	535
Social Services & Community Health	270	-	-	-	-	-	270
Solicitor General	1,259	3,175	-	-	-	-	4,434
Tourism & Small Business	509	532	-	-	-	17	1,058
Transportation	1,172	492	25	-	432	843	2,964
Treasury	2,097	-	-	-	-	-	2,097
Workers' Health, Safety & Compensation	737	15	360	10	-	-	1,122
Total	70,850	42,988	14,563	16,711	35,043	9,085	189,240

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TABLE 9. Current Expenditures on R&D, by Department or Agency and Performer, 1983-84

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Advanced Education	-	-	18	1	-	-	19
Agricultural Research Trust	27	-	342	-	-	-	369
Agriculture	4,544	493	3,484	-	4,071	3,190	15,782
Alcoholism & Drug Abuse Commission	1	-	-	-	-	-	1
Attorney General	-	-	436	-	-	-	436
Culture	426	323	-	-	-	24	773
Education	206	10	-	-	5	79	300
Energy & Natural Resources	2,132	2,913	1,153	-	3,734	109	10,041
Environment	2,093	608	659	-	524	-	3,884
Environmental Centre	3,425	-	-	-	-	35	3,460
Executive Council	-	-	-	-	19,950	-	19,950
Hospitals & Medical Care	-	-	2,504	16,544	-	832	19,880
Housing	211	155	-	-	-	4	370
Manpower	-	90	-	-	-	-	90
Mental Health Research Fund	-	-	640	101	-	13	754
Municipal Affairs	48	-	-	-	-	5	53
AOSTRA	2,868	27,575	3,999	-	5,086	1,058	40,586
Recreation & Parks	5	-	22	-	-	-	27
Transportation	2	40	-	-	-	24	66
Workers' Health, Safety & Compensation	12	-	360	-	-	-	372
Total	16,000	32,207	13,617	16,646	33,370	5,373	117,213

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TABLE 10. Application of Expenditures, by Department or Agency, 1983-84

Department or Agency	Advancement of science	Communi- cations	Energy and Fuels		Environmental issues
			Fossil fuels	Other	
	($'000)				
Advanced Education	-	-	-	-	-
Agricultural Research Trust	-	-	-	-	-
Agriculture	-	-	-	-	-
Alcoholism & Drug Abuse Commission	-	-	-	-	-
Attorney General	-	-	-	-	-
Consumer & Corporate Affairs	-	-	-	-	-
Culture	155	-	-	-	-
Economic Development	-	-	-	-	-
Education	-	-	-	-	-
Educational Communications Corporation ACCESS	-	-	-	-	-
Energy & Natural Resources	-	-	16,467	1,063	162
Environment	259	-	172	-	12,268
Environmental Centre	-	-	142	-	3,329
Environment Council	-	-	-	-	1,525
Executive Council	-	-	3,591	-	3,392
Hospitals & Medical Care	-	-	-	-	-
Housing	-	-	-	-	-

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TABLE 10. Application of Expenditures by Department or Agency, 1983-84 - Continued

Department or Agency	Advancement of science	Communi-cations	Energy and fuels		Environmental issues
			Fossil fuels	Other	
	($'000)				
Labour	-	-	-	-	-
Manpower	-	-	-	-	-
Mental Health Research Fund ..	-	-	-	-	-
Municipal Affairs	-	-	-	-	-
AOSTRA	9,085	-	28,633	2,921	-
Recreation & Parks	-	-	-	-	-
Social Services & Community Health	-	-	-	-	-
Solicitor General	-	-	-	-	-
Tourism & Small Business	-	-	-	-	30
Transportation	-	-	-	-	-
Treasury	-	-	-	-	-
Workers' Health, Safety & Compensation	-	-	-	-	-
Total	**9,499**	**-**	**49,005**	**3,984**	**20,706**

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TABLE 10. Application of Expenditures by Department or Agency, 1983-84 - Continued

Department or Agency	Health	Industrial and economic development					
		Agriculture	Fisheries	Forestry	Manufacturing	Minerals	Other
	($'000)						
Advanced Education	19	-	-	-	-	-	-
Agricultural Research Trust ..	-	369	-	-	-	-	-
Agriculture	-	19,532	-	-	-	-	-
Alcoholism & Drug Abuse Commission	320	-	-	-	-	-	-
Attorney General	-	-	-	-	-	-	-
Consumer & Corporate Affairs .	-	-	-	-	-	-	-
Culture	-	-	-	-	-	-	64
Economic Development	-	58	-	79	1,659	-	457
Education	-	-	-	-	-	-	-
Educational Communications Corporation ACCESS	-	-	-	-	-	-	-
Energy & Natural Resources ...	-	110	1,346	5,215	-	805	3,341
Environment	704	107	-	-	-	-	133
Environmental Centre	4,153	2,954	142	142	-	-	-
Environment Council	-	-	-	-	-	-	-
Executive Council	-	-	-	-	-	-	12,967
Hospitals & Medical Care	22,253	-	-	-	-	-	-
Housing	-	-	-	-	-	-	-

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TABLE 10. Application of Expenditures by Department or Agency, 1983-84 - Continued

Department or Agency	Health	Industrial and economic development					
		Agriculture	Fisheries	Forestry	Manufac- turing	Minerals	Other
	($'000)						
Labour	-	-	-	-	-	-	483
Manpower	-	-	-	-	-	-	-
Mental Health Research Fund ..	754	-	-	-	-	-	-
Municipal Affairs	-	-	-	-	-	-	-
AOSTRA........................	-	-	-	-	-	-	-
Recreation & Parks	-	-	-	-	-	-	-
Social Services & Community Health	-	-	-	-	-	-	-
Solicitor General	-	-	-	-	-	-	-
Tourism & Small Business	-	27	-	25	-	-	811
Transportation	-	-	-	-	-	-	-
Treasury	-	-	-	-	-	-	-
Workers' Health, Safety & Compensation	1,122	-	-	-	-	-	-
Total	**29,325**	**23,157**	**1,488**	**5,461**	**1,659**	**805**	**18,256**

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TABLE 10. Application of Expenditures by Department or Agency, 1983-84 - Continued

Department or Agency	Social development and related areas					Transportation	Total
	Culture, sport and recreation	Education	Human resources	Urban and regional studies	Other		
	($'000)						
Advanced Education	-	1,290	-	45	-	-	1,354
Agricultural Research Trust ..	-	-	-	-	-	-	369
Agriculture	-	-	-	-	-	-	19,532
Alcoholism & Drug Abuse Commission	-	-	-	-	-	-	320
Attorney General	-	-	-	-	436	-	436
Consumer & Corporate Affairs .	-	-	-	-	172	-	172
Culture	798	24	-	50	2,743	-	3,834
Economic Development	-	-	-	-	-	1,121	3,374
Education	-	2,724	-	-	-	-	2,724
Educational Communications Corporation ACCESS	-	398	-	-	-	-	398
Energy & Natural Resources ...	-	-	-	-	-	-	28,509
Environment	-	-	-	-	-	-	13,643
Environmental Centre	743	-	-	-	-	-	11,605
Environment Council	-	-	-	-	-	-	1,525
Executive Council	-	-	-	-	-	-	19,950
Hospitals & Medical Care	-	-	-	-	-	-	22,253
Housing	-	-	-	1,206	-	-	1,206

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TABLE 10. Application of Expenditures by Department or Agency, 1983-84 - Concluded

Department or Agency	Social development and related areas					Transportation	Total
	Culture, sport and recreation	Education	Human resources	Urban and regional studies	Other		
	($'000)						
Labour	-	-	479	-	85	-	1,047
Manpower	-	-	1,539	-	-	-	1,539
Mental Health Research Fund	-	-	-	-	-	-	754
Municipal Affairs	-	-	-	1,577	-	-	1,577
AOSTRA	-	-	-	-	-	-	40,639
Recreation & Parks	533	-	-	-	2	-	535
Social Services & Community Health	-	-	-	-	270	-	270
Solicitor General	-	-	-	-	4,434	-	4,434
Tourism & Small Business	-	60	30	75	-	-	1,058
Transportation	-	-	-	217	-	2,747	2,964
Treasury	-	-	-	-	2,097	-	2,097
Workers' Health, Safety & Compensation	-	-	-	-	-	-	1,122
Total	**2,074**	**4,496**	**2,048**	**3,170**	**10,239**	**3,868**	**189,240**

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TABLE 11. Application of Expenditures by Activity, 1983-84

Application	Intramural		Extramural		Total
	Research and development	Related scientific activities	Research and development	Related scientific activities	
	($'000)				
Advancement of science	150	-	9,284	65	9,499
Energy and fuels:					
Fossil fuels	10,565	172	37,763	505	49,005
Other	2,995	-	741	248	3,984
Environmental issues	3,539	9,437	5,091	2,639	20,706
Health	1,061	6,126	21,037	1,101	29,325
Industrial and economic development:					
Agriculture	5,583	5,787	11,639	148	23,157
Fisheries	380	1,069	21	18	1,488
Forestry	1,132	2,628	1,361	340	5,461
Manufacturing	-	900	-	759	1,659
Minerals	-	-	-	805	805
Other	624	3,645	13,214	773	18,256
Social development and related areas:					
Culture, sport and recreation .	551	1,198	22	303	2,074
Education	208	1,731	118	2,439	4,496
Human resources	-	1,899	90	59	2,048
Urban and regional studies	259	2,059	214	638	3,170
Other	362	5,168	554	4,155	10,239
Transportation	2	1,620	64	2,182	3,868
Total	**27,411**	**43,439**	**101,213**	**17,177**	**189,240**

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TABLE 12. Extramural R&D Expenditures, by Sector of Performance and Application, 1983-84

Application	Industry	Universities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)					
Advancement of science	6,797	963	-	1,269	255	9,284
Energy and fuels:						
Fossil fuels	22,992	3,672	-	10,296	803	37,763
Other	275	86	-	380	-	741
Environmental issues	608	611	-	3,872	-	5,091
Health	-	3,546	16,646	-	845	21,037
Industrial and economic development:						
Agriculture	493	3,850	-	4,071	3,225	11,639
Fisheries	-	21	-	-	-	21
Forestry	332	410	-	510	109	1,361
Manufacturing	-	-	-	-	-	-
Minerals	-	-	-	-	-	-
Other	247	-	-	12,967	-	13,214
Social development and related areas:						
Culture, sport and recreation	-	22	-	-	-	22
Education	10	-	-	5	103	118
Human resources	90	-	-	-	-	90
Urban and regional studies	205	-	-	-	9	214
Other	118	436	-	-	-	554
Transportation	40	-	-	-	24	64
Total	**32,207**	**13,617**	**16,646**	**33,370**	**5,373**	**101,213**

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TABLE 13. Departmental Personnel Engaged in Intramural Activities, 1983-84

Department or Agency	Research and development				Related scientific activities			
	Scientific and professional	Technical	Other	Total	Scientific and professional	Technical	Other	Total
	(person-years)							
Advanced Education	...	...	...	...	14	-	1	15
Agricultural Research Trust ...	...	...	...	...	...	...	...	...
Agriculture	55	75	-	130	70	95	...	165
Alcoholism & Drug Abuse Commission	...	...	...	...	3	2	1	6
Attorney General	...	...	...	...	...	...	...	...
Consumer & Corporate Affairs ..	...	...	...	...	4	-	2	6
Culture	11	-	2	13	41	14	20	75
Economic Development	...	...	...	...	65	-	10	75
Education	4	-	2	6	10	2	10	22
Educational Communications Corporation ACCESS	...	...	...	...	5	1	-	6
Energy & Natural Resources	24	12	7	43	72	49	8	129
Environment	15	15	12	42	45	101	15	161
Environmental Centre	27	34	21	82	47	62	32	141
Environment Council	...	...	...	...	17	3	12	32
Executive Council	...	...	...	...	...	...	...	...
Hospitals & Medical Care	-	-	-	-	15	6	12	33
Housing	3	-	-	3	8	1	5	14

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TABLE 13. Departmental Personnel Engaged in Intramural Activities, 1983-84 - Concluded

Department or Agency	Research and development				Related scientific activities			
	Scientific and professional	Technical	Other	Total	Scientific and professional	Technical	Other	Total
	(person-years)							
Labour	...	...	...	...	21	2	6	29
Manpower	-	-	-	-	29	-	11	40
Mental Health Research Fund ...	...	...	...	...	...	...	...	...
Municipal Affairs	1	-	1	2	20	2	8	30
AOSTRA	35	-	12	47	...	...	...	...
Recreation & Parks	...	...	...	...	3	2	-	5
Social Services & Community Health	...	...	...	...	8	2	-	10
Solicitor General	-	...	...	...	14	18	7	39
Tourism & Small Business	-	...	...	...	13	3	5	21
Transportation	...	...	...	...	14	8	4	26
Treasury	...	...	...	...	27	4	24	55
Workers' Health, Safety & Compensation	-	1	-	1	7	5	3	15
Total	175	137	57	369	572	382	196	1,150

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TABLE 14. Total Expenditures by Activity and Performer, 1984-85(e)

Activity	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Research and development:							
Current expenditures:							
In-house	16,912	-	-	-	-	-	16,912
Contracts	59	68,760	4,287	-	8,591	1,544	83,241
Grants	177	1,289	7,811	18,433	25,506	1,920	55,136
Research fellowships	-	-	375	-	-	-	375
Sub-total	17,148	70,049	12,473	18,433	34,097	3,464	155,664
Capital expenditures	4,354	-	-	-	-	-	4,354
Related scientific activities:							
Current expenditures	44,956	9,861	1,001	60	1,301	3,523	60,702
Capital expenditures	1,856	-	-	-	-	-	1,856
Total	**68,314**	**79,910**	**13,474**	**18,493**	**35,398**	**6,987**	**222,576**

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TABLE 15. Total Expenditures, by Department or Agency and Performer, 1984-85(e)

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Advanced Education	462	30	860	5	-	366	1,723
Agricultural Research Trust ..	30	-	364	-	-	-	394
Agriculture	10,712	859	2,316	-	3,836	1,803	19,526
Alcoholism & Drug Abuse Commission	212	78	-	-	-	-	290
Attorney General	-	-	407	-	-	-	407
Consumer & Corporate Affairs .	167	-	-	-	-	-	167
Culture	2,673	1,129	-	-	-	111	3,913
Economic Development	1,600	1,800	-	-	-	-	3,400
Education	1,572	926	60	-	5	916	3,479
Educational Communications Corporation ACCESS	255	150	-	-	-	-	405
Energy & Natural Resources ...	11,078	10,203	712	-	3,988	109	26,090
Environment	8,702	2,953	604	50	447	1,282	14,038
Environmental Centre	11,745	-	-	-	-	35	11,780
Environment Council	1,339	-	-	-	-	-	1,339
Executive Council	-	-	-	-	21,463	-	21,463
Hospitals & Medical Care	3,242	-	2,776	18,327	-	140	24,485
Housing	1,003	616	-	-	-	-	1,619

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TABLE 15. Total Expenditures, by Department or Agency and Performer, 1984-85(e) - Concluded

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Labour	996	-	-	-	-	-	996
Manpower	1,377	157	-	-	-	-	1,534
Mental Health Research Fund	-	-	640	101	-	13	754
Municipal Affairs	1,513	107	-	-	-	57	1,677
AOSTRA	3,466	58,380	4,250	-	5,245	1,306	72,647
Recreation & Parks	170	60	125	-	-	30	385
Social Services and Community Health	290	-	-	-	-	-	290
Solicitor General	1,200	1,800	-	-	-	-	3,000
Tourism & Small Business	540	500	-	-	-	20	1,060
Transportation	1,158	147	-	-	414	799	2,518
Treasury	2,155	-	-	-	-	-	2,155
Workers' Health, Safety & Compensation	657	15	360	10	-	-	1,042
Total	**68,314**	**79,910**	**13,474**	**18,493**	**35,398**	**6,987**	**222,576**

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TABLE 16. Current Expenditures on R&D by Department or Agency and Performer, 1984-85(e)

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Advanced Education	-	-	60	5	-	-	65
Agricultural Research Trust ..	30	-	364	-	-	-	394
Agriculture	5,127	859	2,316	-	3,836	1,803	13,941
Alcoholism & Drug Abuse Commission	1	-	-	-	-	-	1
Attorney General	-	-	407	-	-	-	407
Culture	426	323	-	-	-	24	773
Education	254	4	10	-	5	110	383
Energy & Natural Resources ...	2,011	9,357	687	-	2,910	109	15,074
Environment	2,050	561	586	-	447	-	3,644
Environmental Centre	3,492	-	-	-	-	35	3,527
Executive Council	-	-	-	-	21,463	-	21,463
Hospitals & Medical Care	-	-	2,776	18,327	-	-	21,103
Housing	245	460	-	-	-	-	705
Manpower	-	100	-	-	-	-	100
Mental Health Research Fund ..	-	-	640	101	-	13	754
Municipal Affairs	12	-	-	-	-	-	12
AOSTRA	3,441	58,380	4,250	-	5,245	1,306	72,622
Recreation and Parks	2	-	17	-	-	-	19
Transportation	45	5	-	-	191	64	305
Workers' Health, Safety & Compensation	12	-	360	-	-	-	372
Total	**17,148**	**70,049**	**12,473**	**18,433**	**34,097**	**3,464**	**155,664**

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TABLE 17. Application of Expenditures by Department or Agency, 1984-85(e)

Department or Agency	Advancement of science	Communications	Energy and fuels		Environmental issues
			Fossil fuels	Other	
	($'000)				
Advanced Education	-	-	-	-	-
Agricultural Research Trust ..	-	-	-	-	-
Agriculture	-	-	-	-	-
Alcoholism & Drug Abuse					
Commission	-	-	-	-	-
Attorney General	-	-	-	-	-
Consumer & Corporate Affairs .	-	-	-	-	-
Culture	155	-	-	-	-
Economic Development	-	-	-	-	-
Education	-	-	-	-	-
Educational Communications					
Corporation ACCESS	-	-	-	-	-
Energy & Natural Resources ...	-	-	14,075	1,792	60
Environment	215	-	170	-	12,578
Environmental Centre	-	-	144	-	3,379
Environment Council	-	-	-	-	1,339
Executive Council	-	-	3,863	-	3,649
Hospitals & Medical Care	-	-	-	-	-
Housing	-	-	-	-	-

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TABLE 17. Application of Expenditures by Department or Agency, 1984-85(e) - Continued

Department or Agency	Advancement of science	Communications	Energy and fuels		Environmental issues
			Fossil fuels	Other	
	($'000)				
Labour	-	-	-	-	-
Manpower	-	-	-	-	-
Mental Health Research Fund	-	-	-	-	-
Municipal Affairs	-	-	-	-	-
AOSTRA	9,495	-	59,686	3,466	-
Recreation & Parks	-	-	-	-	-
Social Services & Community Health	-	-	-	-	-
Solicitor General	-	-	-	-	-
Tourism & Small Business	-	-	-	-	20
Transportation	-	-	-	-	-
Treasury	-	-	-	-	-
Workers' Health, Safety & Compensation	-	-	-	-	-
Total	**9,865**	**-**	**77,938**	**5,258**	**21,025**

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TABLE 17. Application of Expenditures by Department or Agency, 1984-85(e) - Continued

Department or Agency	Health	Industrial and economic development					
		Agriculture	Fisheries	Forestry	Manufacturing	Minerals	Other
	($'000)						
Advanced Education	65	-	-	-	-	-	-
Agricultural Research Trust ..	-	394	-	-	-	-	-
Agriculture	-	19,526	-	-	-	-	-
Alcoholism & Drug Abuse Commission	290	-	-	-	-	-	-
Attorney General	-	-	-	-	-	-	-
Consumer & Corporate Affairs .	-	-	-	-	-	-	-
Culture	-	-	-	-	-	-	64
Economic Development	-	60	-	80	1,660	-	460
Education	-	-	-	-	-	-	-
Educational Communications Corporation ACCESS	-	-	-	-	-	-	-
Energy & Natural Resources ...	-	117	1,208	5,285	-	830	2,723
Environment	778	62	-	-	-	-	235
Environmental Centre	4,216	2,999	144	144	-	-	-
Environment Council	-	-	-	-	-	-	-
Executive Council	-	-	-	-	-	-	13,951
Hospitals & Medical Care	24,485	-	-	-	-	-	-
Housing	-	-	-	-	-	-	-

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TABLE 17. Application of Expenditures by Department or Agency, 1984-85(e) - Continued

Department or Agency	Health	Industrial and economic development					
		Agriculture	Fisheries	Forestry	Manufac-turing	Minerals	Other
	($'000)						
Labour	-	-	-	-	-	-	492
Manpower	-	-	-	-	-	-	-
Mental Health Research Fund ..	754	-	-	-	-	-	-
Municipal Affairs	-	-	-	-	-	-	-
AOSTRA........................	-	-	-	-	-	-	-
Recreation & Parks	-	-	-	-	-	-	-
Social Services & Community Health	-	-	-	-	-	-	-
Solicitor General	-	-	-	-	-	-	-
Tourism & Small Business	10	-	30	-	-	-	860
Transportation	-	-	-	-	-	-	-
Treasury	-	-	-	-	-	-	-
Workers' Health, Safety & Compensation	1,042	-	-	-	-	-	-
Total	31,640	23,158	1,382	5,509	1,660	830	18,785

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TABLE 17. Application of Expenditures by Department or Agency, 1984-85(e) - Continued

Department or Agency	Social development and related areas					Transportation	Total
	Culture, sport and recreation	Education	Human resources	Urban and regional studies	Other		
	($'000)						
Advanced Education	-	1,593	-	65	-	-	1,723
Agricultural Research Trust ..	-	-	-	-	-	-	394
Agriculture	-	-	-	-	-	-	19,526
Alcoholism & Drug Abuse Commission	-	-	-	-	-	-	290
Attorney General	-	-	-	-	407	-	407
Consumer & Corporate Affairs .	-	-	-	-	167	-	167
Culture	877	24	-	50	2,743	-	3,913
Economic Development	-	-	-	-	-	1,140	3,400
Education	-	3,479	-	-	-	-	3,479
Educational Communications Corporation ACCESS	-	405	-	-	-	-	405
Energy & Natural Resources ...	-	-	-	-	-	-	26,090
Environment	-	-	-	-	-	-	14,038
Environmental Centre	754	-	-	-	-	-	11,780
Environment Council	-	-	-	-	-	-	1,339
Executive Council	-	-	-	-	-	-	21,463
Hospitals & Medical Care	-	-	-	-	-	-	24,485
Housing	-	-	-	1,619	-	-	1,619

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TABLE 17. Application of Expenditures by Department or Agency, 1984-85(e) - Concluded

Department or Agency	Social development and related areas						
	Culture, sport and recreation	Education	Human resources	Urban and regional studies	Other	Transportation	Total
	($'000)						
Labour	-	-	504	-	-	-	996
Manpower	-	-	1,534	-	-	-	1,534
Mental Health Research Fund	-	-	-	-	-	-	754
Municipal Affairs	-	-	-	1,677	-	-	1,677
AOSTRA	-	-	-	-	-	-	72,647
Recreation & Parks	385	-	-	-	-	-	385
Social Services and Community Health	-	-	-	-	290	-	290
Solicitor General	-	-	-	-	3,000	-	3,000
Tourism & Small Business	-	50	-	90	-	-	1,060
Transportation	-	-	-	143	-	2,375	2,518
Treasury	-	-	-	-	2,155	-	2,155
Workers' Health, Safety & Compensation	-	-	-	-	-	-	1,042
Total	**2,016**	**5,551**	**2,038**	**3,644**	**8,762**	**3,515**	**222,576**

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TABLE 18. Application of Expenditures by Activity, 1984-85(e)

Application	Intramural		Extramural		Total
	Research and development	Related scientific activities	Research and development	Related scientific activities	
	($'000)				
Advancement of science	150	-	9,665	50	9,865
Energy and fuels:					
Fossil fuels	3,643	170	73,770	355	77,938
Other	3,689	-	1,321	248	5,258
Environmental issues	3,400	9,271	5,186	3,168	21,025
Health	1,012	7,756	22,306	566	31,640
Industrial and economic development:					
Agriculture	6,184	7,594	9,231	149	23,158
Fisheries	331	911	-	140	1,382
Forestry	1,134	2,693	1,361	321	5,509
Manufacturing	-	900	-	760	1,660
Minerals	-	-	-	830	830
Other	485	3,322	14,111	867	18,785
Social development and related areas:					
Culture, sport and recreation .	556	1,245	17	198	2,016
Education	254	2,055	153	3,089	5,551
Human resources	-	1,881	100	57	2,038
Urban and regional studies	257	2,269	510	608	3,644
Other	362	5,182	525	2,693	8,762
Transportation	45	1,563	260	1,647	3,515
Total	**21,502**	**46,812**	**138,516**	**15,746**	**222,576**

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TABLE 19. Extramural R&D Expenditures, by Sector of Performance and Application, 1984-85(e)

Application	Industry	Universities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)					
Advancement of science	8,168	583	-	735	179	9,665
Energy and fuels:						
Fossil fuels	59,242	3,934	-	9,467	1,127	73,770
Other	-	-	-	1,321	-	1,321
Environmental issues	561	544	-	4,081	-	5,186
Health	-	3,860	18,433	-	13	22,306
Industrial and economic development:						
Agriculture	859	2,698	-	3,836	1,838	9,231
Fisheries	-	-	-	-	-	-
Forestry	332	410	-	510	109	1,361
Other	150	10	-	13,951	-	14,111
Social development and related areas:						
Culture, sport and recreation .	-	17	-	-	-	17
Education	4	10	-	5	134	153
Human resources	100	-	-	-	-	100
Urban and regional studies	510	-	-	-	-	510
Other	118	407	-	-	-	525
Transportation	5	-	-	191	64	260
Total	**70,049**	**12,473**	**18,433**	**34,097**	**3,464**	**138,516**

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TABLE 20. Departmental Personnel Engaged in Intramural Activities, 1984-85(e)

Department or Agency	Research and development				Related scientific activities			
	Scientific and professional	Technical	Other	Total	Scientific and professional	Technical	Other	Total
	(person-years)							
Advanced Education	...	...	...	...	16	-	2	18
Agricultural Research Trust	...	...	...	...	...	...	...	...
Agriculture	55	75	-	130	70	95	...	165
Alcoholism & Drug Abuse Commission	...	...	...	...	3	2	1	6
Attorney General	...	...	...	...	...	...	...	...
Consumer & Corporate Affairs	...	...	...	...	4	-	1	5
Culture	11	-	2	13	41	12	20	73
Economic Development	...	...	...	...	65	-	10	75
Education	5	-	2	7	11	2	10	23
Educational Communications Corporation ACCESS	...	...	...	...	5	1	-	6
Energy & Natural Resources	22	12	7	41	68	46	8	122
Environment	15	15	12	42	43	101	15	159
Environmental Centre	27	34	24	85	47	62	38	147
Environment Council	...	...	...	...	15	3	11	29
Executive Council	...	...	...	...	...	...	...	...
Hospitals & Medical Care	...	...	...	...	16	5	11	32
Housing	3	-	1	4	9	1	3	13

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TABLE 20. Departmental Personnel Engaged in Intramural Activities, 1984-85(e) - Concluded

Department or Agency	Research and development				Related scientific activities			
	Scientific and professional	Technical	Other	Total	Scientific and professional	Technical	Other	Total
	(person-years)							
Labour	...	...	...	...	22	2	6	30
Manpower	...	...	...	...	29	-	13	42
Mental Health Research Fund ...	...	...	...	...	...	...	...	...
Municipal Affairs	-	-	1	1	23	2	8	33
AOSTRA	37	-	12	49	...	...	...	...
Recreation & Parks	...	...	...	...	5	-	-	5
Social Services & Community Health	...	...	...	...	8	2	-	10
Solicitor General	...	...	...	...	14	17	7	38
Tourism & Small Business	...	...	...	...	11	6	6	23
Transportation	-	1	-	1	14	6	4	24
Treasury	...	...	...	...	27	4	22	53
Workers' Health, Safety & Compensation	...	...	...	...	7	5	3	15
Total	175	137	61	373	573	374	199	1,146

Natural Sciences

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TABLE 21. Total Expenditures in the Natural Sciences, by Activity, 1977-78 to 1984-85(e)

Activity	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Research and development:								
Current expenditures:								
In-house	3,355	2,001	4,842	6,737	11,156	14,514	15,128	16,238
Contracts	19,669	36,877	47,294	38,797	46,592	51,563	46,107	82,655
Grants	17,488	18,444	25,815	29,814	32,533	41,002	53,039	53,736
Research fellowships	152	110	202	85	267	283	473	348
Sub-total	40,664	57,432	78,153	75,433	90,548	107,362	114,747	152,977
Capital expenditures	590	2,381	1,380	1,408	1,929	8,020	11,409	4,354
Related scientific activities:								
Current expenditures	8,784	7,746	13,091	17,204	30,161	26,644	31,097	32,549
Capital expenditures	124	72	439	628	1,712	1,822	1,818	1,828
Total	50,162	67,631	93,063	94,673	124,350	143,848	159,071	191,708

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TABLE 22. Total Expenditures in the Natural Sciences, by Department or Agency, 1977-78 to 1984-85(e)

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Agricultural Research Trust ..	...	441	472	389	395	373	369	394
Agriculture	3,750	3,500	4,656	7,130	14,978	16,391	19,532	19,526
Business Development & Tourism	7,520	...	...	...	...	...	...	...
Culture	1,111(e)	969	777	510	986	578	798	877
Energy & Natural Resources ...	5,163	9,140	12,819	14,274	20,630	25,210	28,509	26,090
Environment	8,364	5,636	10,321	11,649	11,711	9,179	13,411	13,783
Environmental Centre	...	...	-	3,168	7,441	10,528	11,605	11,780
Executive Council	...	8,209	9,153	11,561	15,500	19,148	19,950	21,463
Hospitals & Medical Care	1,848	4,517	11,896	12,138	12,942	16,865	19,793	20,992
Housing	...	...	...	...	...	...	467	675
Labour	257(e)	263(e)	267(e)	340(e)	425(e)	548	483	492
Mental Health Research Fund ..	...	60	72	123	177	193	409	409
AOSTRA	18,737	32,746	40,195	30,988	35,335	41,105	40,639	72,647
Recreation & Parks	...	--	398	295	604	429	328	245
Recreation, Parks & Wildlife	889(e)	...	...	...	...	...	...	...
Transportation	2,564	1,888	1,811	1,932	3,050	3,262	2,587	2,246
Workers' Health, Safety & Compensation	...	262	276	176	176	39	191	89
Total	50,162	67,631	93,063	94,673	124,350	143,848	159,071	191,708

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TABLE 23. Total Expenditures in the Natural Sciences, by Performer, 1977-78 to 1984-85(e)

Performer	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Intramural	9,456	9,905	15,584	16,201	35,487	45,049	53,272	48,751
Industry	22,995	35,607	43,979	36,743	35,871	35,452	34,448	72,902
Universities	1,817	3,700	5,090	6,473	8,502	16,032	12,905	11,536
Hospitals and health organizations	1,848	4,531	11,862	12,138	12,630	11,080	16,498	18,276
Alberta Research Council (1) .	10,741	12,874	14,009	20,587	27,745	32,349	35,038	35,393
Other	3,305	1,014	2,539	2,531	4,115	3,886	6,910	4,850
Total	**50,162**	**67,631**	**93,063**	**94,673**	**124,350**	**143,848**	**159,071**	**191,708**

(1) Annual funding by the Government of Alberta - other funds are not included.

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TABLE 24. Current Expenditures on R&D in the Natural Sciences, by Performer, 1977-78 to 1984-85(e)

Performer	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Intramural	3,372	2,929	5,096	6,794	11,208	14,514	15,319	16,455
Industry	20,734	33,776	41,309	28,263	28,461	32,058	31,784	69,492
Universities	1,650	3,360	4,840	6,286	8,333	15,777	12,594	11,405
Hospitals and health organizations	1,848	4,531	11,862	12,138	12,630	11,080	16,433	18,216
Alberta Research Council (1)	10,188	12,175	12,837	19,565	26,679	31,179	33,365	34,092
Other	2,872	661	2,209	2,387	3,237	2,754	5,252	3,317
Total	**40,664**	**57,432**	**78,153**	**75,433**	**90,548**	**107,362**	**114,747**	**152,977**

(1) Annual funding by the Government of Alberta - other funds are not included.

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TABLE 25. Current Expenditures on R&D in the Natural Sciences, by Department or Agency, 1977-78 to 1984-85(e)

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Agricultural Research Trust ..	...	441	472	389	395	373	369	394
Agriculture	3,750	3,500	4,656	7,130	10,978	13,699	15,782	13,941
Business Development & Tourism	7,520	...	...	...	...	...	...	...
Culture	261	188	173	-	-	-	-	-
Energy & Natural Resources ...	3,669	4,739	6,193	7,390	9,608	9,521	10,041	15,074
Environment	3,864	2,586	4,328	3,480	3,214	3,481	3,884	3,644
Environmental Centre	...	...	-	1,300	2,157	2,997	3,460	3,527
Executive Council	...	8,209	9,153	11,561	15,500	19,148	19,950	21,463
Hospitals & Medical Care	1,848	4,517	11,846	12,138	12,942	16,865	19,769	20,992
Housing	-	-	-	-	-	-	370	575
Mental Health Research Fund ..	...	60	72	123	177	193	409	409
AOSTRA	18,126	32,177	40,077	30,960	35,305	41,066	40,586	72,622
Recreation & Parks	...	--	-	-	-	-	27	19
Recreation, Parks & Wildlife	445(e)	...	...	...	...	...	...	...
Transportation	1,181	998	1,131	952	272	13	66	305
Workers' Health, Safety & Compensation	...	17	52	10	-	6	34	12
Total	**40,664**	**57,432**	**78,153**	**75,433**	**90,548**	**107,362**	**114,747**	**152,977**

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TABLE 26. Total Expenditures in the Natural Sciences, by Sources of Funds, 1983-84

Department or Agency	Departmental budget	Transfers from other departments	Transfers from federal government	Trust funds	Other sources	Total
	($'000)					
Agricultural Research Trust ..	-	250	-	-	119	369
Agriculture	11,678	-	-	7,854	-	19,532
Culture	798	-	-	-	-	798
Energy & Natural Resources ...	11,777	-	-	-	16,732	28,509
Environment	13,217	-	-	194	-	13,411
Environmental Centre	11,539	66	-	-	-	11,605
Executive Council	19,950	-	-	-	-	19,950
Hospitals & Medical Care	15,554	-	-	4,239	-	19,793
Housing	467	-	-	-	-	467
Labour	483	-	-	-	-	483
Mental Health Research Fund ..	-	409	-	-	-	409
AOSTRA	2,921	-	-	37,718	-	40,639
Recreation & Parks	166	-	-	-	162	328
Transportation	2,587	-	-	-	-	2,587
Workers' Health, Safety & Compensation	169	-	-	-	22	191
Total	91,306	725	-	50,005	17,035	159,071

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TABLE 27. Total Expenditures in the Natural Sciences, by Activity and Performer, 1983-84

Activity	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Research and development:							
Current expenditures:							
In-house	15,128	...	...	...	...	...	15,128
Contracts	20	31,150	4,467	-	9,344	1,126	46,107
Grants	171	634	7,654	16,433	24,021	4,126	53,039
Research fellowships	-	-	473	-	-	-	473
Sub-total	15,319	31,784	12,594	16,433	33,365	5,252	114,747
Capital expenditures	11,409	...	...	...	...	...	11,409
Related scientific activities:							
Current expenditures	24,726	2,664	311	65	1,673	1,658	31,097
Capital expenditures	1,818	...	...	...	...	...	1,818
Total	53,272	34,448	12,905	16,498	35,038	6,910	159,071

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TABLE 28. Total Expenditures in the Natural Sciences, by Department or Agency and Performer, 1983-84

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Agricultural Research Trust ..	27	-	342	-	-	-	369
Agriculture	8,294	493	3,484	-	4,071	3,190	19,532
Culture	798	-	-	-	-	-	798
Energy & Natural Resources ...	18,618	3,602	1,281	-	4,899	109	28,509
Environment	8,789	2,343	693	55	600	931	13,411
Environmental Centre	11,570	-	-	-	-	35	11,605
Executive Council	-	-	-	-	19,950	-	19,950
Hospitals & Medical Care	-	-	2,504	16,433	-	856	19,793
Housing	296	167	-	-	-	4	467
Labour	483	-	-	-	-	-	483
Mental Health Research Fund ..	-	-	409	-	-	-	409
AOSTRA	2,921	27,575	3,999	-	5,086	1,058	40,639
Recreation & Parks	145	37	146	-	-	-	328
Transportation	1,172	231	25	-	432	727	2,587
Workers' Health, Safety & Compensation	159	-	22	10	-	-	191
Total	**53,272**	**34,448**	**12,905**	**16,498**	**35,038**	**6,910**	**159,071**

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TABLE 29. Current Expenditures on R&D in the Natural Sciences, by Department or Agency and Performer, 1983-84

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Agricultural Research Trust	27	-	342	-	-	-	369
Agriculture	4,544	493	3,484	-	4,071	3,190	15,782
Energy & Natural Resources	2,132	2,913	1,153	-	3,734	109	10,041
Environment	2,093	608	659	-	524	-	3,884
Environmental Centre	3,425	-	-	-	-	35	3,460
Executive Council	-	-	-	-	19,950	-	19,950
Hospitals & Medical Care	-	-	2,504	16,433	-	832	19,769
Housing	211	155	-	-	-	4	370
Mental Health Research Fund	-	-	409	-	-	-	409
AOSTRA	2,868	27,575	3,999	-	5,086	1,058	40,586
Recreation & Parks	5	-	22	-	-	-	27
Transportation	2	40	-	-	-	24	66
Workers' Health, Safety & Compensation	12	-	22	-	-	-	34
Total	**15,319**	**31,784**	**12,594**	**16,433**	**33,365**	**5,252**	**114,747**

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TABLE 30. Application of Expenditures in the Natural Sciences, by Department or Agency, 1983-84

Department or Agency	Advancement of science	Communi- cations	Energy and fuels		Environmental issues
			Fossil fuels	Other	
	($'000)				
Agricultural Research Trust .	-	-	-	-	-
Agriculture	-	-	-	-	-
Culture	-	-	-	-	-
Energy & Natural Resources ..	-	-	16,467	1,063	162
Environment	259	-	172	-	12,169
Environmental Centre	-	-	142	-	3,329
Executive Council	-	-	3,591	-	3,392
Hospitals & Medical Care	-	-	-	-	-
Housing	-	-	-	-	-
Labour	-	-	-	-	-
Mental Health Research Fund .	-	-	-	-	-
AOSTRA	9,085	-	28,633	2,921	-
Recreation & Parks	-	-	-	-	-
Transportation	-	-	-	-	-
Workers' Health, Safety & Compensation	-	-	-	-	-
Total	**9,344**	-	**49,005**	**3,984**	**19,052**

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TABLE 30. Application of Expenditures in the Natural Sciences, by Department or Agency, 1983-84 - Continued

Department or Agency	Health	Industrial and economic development				
		Agriculture	Fisheries	Forestry	Minerals	Other
	($'000)					
Agricultural Research Trust .	-	369	-	-	-	-
Agriculture	-	19,532	-	-	-	-
Culture	-	-	-	-	-	-
Energy & Natural Resources ..	-	110	1,346	5,215	805	3,341
Environment	704	107	-	-	-	-
Environmental Centre	4,153	2,954	142	142	-	-
Executive Council	-	-	-	-	-	12,967
Hospitals & Medical Care	19,793	-	-	-	-	-
Housing	-	-	-	-	-	-
Labour	-	-	-	-	-	483
Mental Health Research Fund .	409	-	-	-	-	-
AOSTRA	-	-	-	-	-	-
Recreation & Parks	-	-	-	-	-	-
Transportation	-	-	-	-	-	-
Workers' Health, Safety & Compensation	191	-	-	-	-	-
Total	**25,250**	**23,072**	**1,488**	**5,357**	**805**	**16,791**

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TABLE 30. Application of Expenditures in the Natural Sciences, by Department or Agency, 1983-84 - Concluded

Department or Agency	Social development and related areas				Transportation	Total
	Culture, sport and recreation	Education	Human resources	Urban and regional studies		
	($'000)					
Agricultural Research Trust .	-	-	-	-	-	369
Agriculture	-	-	-	-	-	19,532
Culture	798	-	-	-	-	798
Energy & Natural Resources ..	-	-	-	-	-	28,509
Environment	-	-	-	-	-	13,411
Environmental Centre	743	-	-	-	-	11,605
Executive Council	-	-	-	-	-	19,950
Hospitals & Medical Care	-	-	-	-	-	19,793
Housing	-	-	-	467	-	467
Labour	-	-	-	-	-	483
Mental Health Research Fund .	-	-	-	-	-	409
AOSTRA	-	-	-	-	-	40,639
Recreation & Parks	328	-	-	-	-	328
Transportation	-	-	-	-	2,587	2,587
Workers' Health, Safety & Compensation	-	-	-	-	-	191
Total	1,869	-	-	467	2,587	159,071

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TABLE 31. Application of Expenditures in the Natural Sciences, by Activity, 1983-84

Application	Intramural		Extramural		Total
	Research and development	Related scientific activities	Research and development	Related scientific activities	
	($'000)				
Advancement of science	150	-	9,129	65	9,344
Energy and fuels:					
Fossil fuels	10,565	172	37,763	505	49,005
Other	2,995	-	741	248	3,984
Environmental issues	3,539	7,898	5,091	2,524	19,052
Health	1,060	3,690	20,224	276	25,250
Industrial and economic development:					
Agriculture	5,583	5,777	11,639	73	23,072
Fisheries	380	1,069	21	18	1,488
Forestry	1,132	2,573	1,361	291	5,357
Minerals	-	-	-	805	805
Other	560	2,975	13,214	42	16,791
Social development and related areas:					
Culture, sport and recreation .	551	1,135	22	161	1,869
Urban and regional studies	211	85	159	12	467
Transportation	2	1,170	64	1,351	2,587
Total	**26,728**	**26,544**	**99,428**	**6,371**	**159,071**

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TABLE 32. Extramural R&D Expenditures in the Natural Sciences, by Sector of Performance and Application, 1983-84

Application	Industry	Universities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)					
Advancement of science	6,642	963	-	1,269	255	9,129
Energy and fuels:						
Fossil fuels	22,992	3,672	-	10,296	803	37,763
Other	275	86	-	380	-	741
Environmental issues	608	611	-	3,872	-	5,091
Health	-	2,959	16,433	-	832	20,224
Industrial and economic development:						
Agriculture	493	3,850	-	4,071	3,225	11,639
Fisheries	-	21	-	-	-	21
Forestry	332	410	-	510	109	1,361
Other	247	-	-	12,967	-	13,214
Social development and related areas:						
Culture, sport and recreation .	-	22	-	-	-	22
Urban and regional studies	155	-	-	-	4	159
Transportation	40	-	-	-	24	64
Total	31,784	12,594	16,433	33,365	5,252	99,428

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TABLE 33. Departmental Personnel Engaged in Intramural Natural Science Activities, 1983-84

Department or Agency	Research and development				Related scientific activities			
	Scientific and professional	Technical	Other	Total	Scientific and professional	Technical	Other	Total
	(person-years)							
Agricultural Research Trust ...	...	...	...	...	...	...	...	...
Agriculture	55	75	-	130	70	95	...	165
Culture	...	...	...	...	9	9	3	21
Energy & Natural Resources	24	12	7	43	72	49	8	129
Environment	15	15	12	42	45	101	15	161
Environmental Centre	27	34	21	82	47	62	32	141
Executive Council	...	...	...	...	...	...	...	...
Hospitals & Medical Care	...	...	...	...	...	...	...	...
Housing	3	-	-	3	1	-	2	3
Labour	...	...	...	...	13	-	-	13
Mental Health Research Fund ...	...	...	...	...	...	...	...	...
AOSTRA	35	-	12	47	...	...	...	...
Recreation & Parks	...	...	...	...	2	1	-	3
Transportation	...	...	...	...	14	8	4	26
Workers' Health, Safety & Compensation	-	1	-	1	1	1	1	3
Total	**159**	**137**	**52**	**348**	**274**	**326**	**65**	**665**

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TABLE 34. Total Expenditures in the Natural Sciences, by Activity and Performer, 1984-85(e)

Activity	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Research and development:							
Current expenditures:							
In-house	16,238	-	-	-	-	-	16,238
Contracts	40	68,333	4,277	-	8,591	1,414	82,655
Grants	177	1,159	6,780	18,216	25,501	1,903	53,736
Research fellowships	-	-	348	-	-	-	348
Sub-total	16,455	69,492	11,405	18,216	34,092	3,317	152,977
Capital expenditures	4,354	-	-	-	-	-	4,354
Related scientific activities:							
Current expenditures	26,114	3,410	131	60	1,301	1,533	32,549
Capital expenditures	1,828	-	-	-	-	-	1,828
Total	48,751	72,902	11,536	18,276	35,393	4,850	191,708

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TABLE 35. Total Expenditures in the Natural Sciences, by Department or Agency and Performer, 1984-85(e)

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Agricultural Research Trust ..	30	-	364	-	-	-	394
Agriculture	10,712	859	2,316	-	3,836	1,803	19,526
Culture	877	-	-	-	-	-	877
Energy & Natural Resources ...	11,078	10,203	712	-	3,988	109	26,090
Environment	8,679	2,953	604	50	447	1,050	13,783
Environmental Centre	11,745	-	-	-	-	35	11,780
Executive Council	-	-	-	-	21,463	-	21,463
Hospitals & Medical Care	-	-	2,776	18,216	-	-	20,992
Housing & Public Works	325	350	-	-	-	-	675
Labour	492	-	-	-	-	-	492
Mental Health Research Fund ..	-	-	409	-	-	-	409
AOSTRA	3,466	58,380	4,250	-	5,245	1,306	72,647
Recreation & Parks	110	30	105	-	-	-	245
Transportation	1,158	127	-	-	414	547	2,246
Workers' Health, Safety & Compensation	79	-	-	10	-	-	89
Total	**48,751**	**72,902**	**11,536**	**18,276**	**35,393**	**4,850**	**191,708**

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TABLE 36. Current Expenditures on R&D in the Natural Sciences, by Department or Agency and Performer, 1984-85(e)

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Agricultural Research Trust ..	30	-	364	-	-	-	394
Agriculture	5,127	859	2,316	-	3,836	1,803	13,941
Energy & Natural Resources ...	2,011	9,357	687	-	2,910	109	15,074
Environment	2,050	561	586	-	447	-	3,644
Environmental Centre	3,492	-	-	-	-	35	3,527
Executive Council	-	-	-	-	21,463	-	21,463
Hospitals & Medical Care	-	-	2,776	18,216	-	-	20,992
Housing	245	330	-	-	-	-	575
Mental Health Research Fund ..	-	-	409	-	-	-	409
AOSTRA	3,441	58,380	4,250	-	5,245	1,306	72,622
Recreation & Parks	2	-	17	-	-	-	19
Transportation	45	5	-	-	191	64	305
Workers' Health, Safety & Compensation	12	-	-	-	-	-	12
Total	**16,455**	**69,492**	**11,405**	**18,216**	**34,092**	**3,317**	**152,977**

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TABLE 37. Application of Expenditures in the Natural Sciences, by Department or Agency, 1984-85(e)

Department or Agency	Advancement of science	Communi- cations	Energy and fuels		Environmental issues
			Fossil fuels	Other	
	($'000)				
Agricultural Research Trust	-	-	-	-	-
Agriculture	-	-	-	-	-
Culture	-	-	-	-	-
Energy & Natural Resources	-	-	14,075	1,792	60
Environment	215	-	170	-	12,558
Environmental Centre	-	-	144	-	3,379
Executive Council	-	-	3,863	-	3,649
Hospitals & Medical Care	-	-	-	-	-
Housing	-	-	-	-	-
Labour	-	-	-	-	-
Mental Health Research Fund	-	-	-	-	-
AOSTRA	9,495	-	59,686	3,466	-
Recreation & Parks	-	-	-	-	-
Transportation	-	-	-	-	-
Workers' Health, Safety & Compensation	-	-	-	-	-
Total	**9,710**	-	**77,938**	**5,258**	**19,646**

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TABLE 37. Application of Expenditures in the Natural Sciences, by Department or Agency, 1984-85(e) - Continued

Department or Agency	Health	Industrial and economic development					
		Agriculture	Fisheries	Forestry	Manufacturing	Minerals	Other
	($'000)						
Agricultural Research Trust .	-	394	-	-	-	-	-
Agriculture	-	19,526	-	-	-	-	-
Culture	-	-	-	-	-	-	-
Energy & Natural Resources ..	-	117	1,208	5,285	-	830	2,723
Environment	778	62	-	-	-	-	-
Environmental Centre	4,216	2,999	144	144	-	-	-
Executive Council	-	-	-	-	-	-	13,951
Hospitals & Medical Care	20,992	-	-	-	-	-	-
Housing	-	-	-	-	-	-	-
Labour	-	-	-	-	-	-	492
Mental Health Research Fund .	409	-	-	-	-	-	-
AOSTRA	-	-	-	-	-	-	-
Recreation & Parks	-	-	-	-	-	-	-
Transportation	-	-	-	-	-	-	-
Workers' Health, Safety & Compensation	89	-	-	-	-	-	-
Total	**26,484**	**23,098**	**1,352**	**5,429**	**-**	**830**	**17,166**

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TABLE 37. Application of Expenditures in the Natural Sciences, by Department or Agency, 1984-85(e) - Concluded

Department or Agency	Social development and related areas					
	Culture, sport and recreation	Education	Human resources	Urban and regional studies	Transportation	Total
	($'000)					
Agricultural Research Trust .	-	-	-	-	-	394
Agriculture	-	-	-	-	-	19,526
Culture	877	-	-	-	-	877
Energy & Natural Resources ..	-	-	-	-	-	26,090
Environment	-	-	-	-	-	13,783
Environmental Centre	754	-	-	-	-	11,780
Executive Council	-	-	-	-	-	21,463
Hospitals & Medical Care	-	-	-	-	-	20,992
Housing	-	-	-	675	-	675
Labour	-	-	-	-	-	492
Mental Health Research Fund .	-	-	-	-	-	409
AOSTRA	-	-	-	-	-	72,647
Recreation & Parks	245	-	-	-	-	245
Transportation	-	-	-	-	2,246	2,246
Workers' Health, Safety & Compensation	-	-	-	-	-	89
Total	1,876	-	-	675	2,246	191,708

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TABLE 38. Application of Expenditures in the Natural Sciences, by Activity, 1984-85(e)

Application	Intramural		Extramural		Total
	Research and development	Related scientific activities	Research and development	Related scientific activities	
	($'000)				
Advancement of science	150	-	9,510	50	9,710
Energy and fuels:					
Fossil fuels	3,643	170	73,770	355	77,938
Other	3,689	-	1,321	248	5,258
Environmental issues	3,400	7,932	5,186	3,128	19,646
Health	1,011	3,715	21,425	333	26,484
Industrial and economic development:					
Agriculture	6,184	7,594	9,231	89	23,098
Fisheries	331	901	-	120	1,352
Forestry	1,134	2,643	1,361	291	5,429
Minerals	-	-	-	830	830
Other	421	2,609	14,111	25	17,166
Social development and related areas:					
Culture, sport and recreation .	556	1,185	17	118	1,876
Urban and regional studies	245	80	330	20	675
Transportation	45	1,113	260	828	2,246
Total	20,809	27,942	136,522	6,435	191,708

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TABLE 39. Extramural R&D Expenditures in the Natural Sciences, by Sector of Performance and Application, 1984-85(e)

Application	Industry	Universities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)					
Advancement of science	8,013	583	-	735	179	9,510
Energy and fuels:						
Fossil fuels	59,242	3,934	-	9,467	1,127	73,770
Nuclear energy	-	-	-	-	-	-
Other	-	-	-	1,321	-	1,321
Environmental issues	561	544	-	4,081	-	5,186
Health	-	3,209	18,216	-	-	21,425
Industrial and economic development:						
Agriculture	859	2,698	-	3,836	1,838	9,231
Fisheries	-	-	-	-	-	-
Forestry	332	410	-	510	109	1,361
Other	150	10	-	13,951	-	14,111
Social development and related areas:						
Culture, sport and recreation	-	17	-	-	-	17
Urban and regional studies	330	-	-	-	-	330
Transportation	5	-	-	191	64	260
Total	69,492	11,405	18,216	34,092	3,317	136,522

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TABLE 40. Departmental Personnel Engaged in Intramural Natural Science Activities, 1984-85(e)

Department or Agency	Research and development				Related scientific activities			
	Scientific and professional	Technical	Other	Total	Scientific and professional	Technical	Other	Total
	(person-years)							
Agricultural Research Trust ...	...	...	...	...	...	...	...	...
Agriculture	55	75	-	130	70	95	...	165
Culture	...	...	...	...	9	7	3	19
Energy & Natural Resources	22	12	7	41	68	46	8	122
Environment	15	15	12	42	43	101	15	159
Environmental Centre	27	34	24	85	47	62	38	147
Executive Council	...	...	...	...	...	...	...	...
Hospitals & Medical Care	...	...	...	...	...	...	...	...
Housing	3	-	1	4	1	-	1	2
Labour	...	...	...	...	13	-	-	13
Mental Health Research Fund ...	...	...	...	...	...	...	...	...
AOSTRA	37	-	12	49	...	...	...	...
Recreation & Parks	...	...	...	...	3	-	-	3
Transportation	-	1	-	1	14	6	4	24
Workers' Health, Safety & Compensation	...	...	...	...	1	1	1	3
Total	159	137	56	352	269	318	70	657

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TABLE 41. Total Expenditures in the Social Sciences and Humanities, by Activity, 1977-78 to 1984-85(e)

Activity	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Research and development:								
Current expenditures:								
In-house	616	647	810	751	669	237	657	674
Contracts	821	1,141	1,428	762	564	406	551	586
Grants	631	1,290	1,479	890	1,028	1,038	1,228	1,400
Research fellowships	-	2	-	27	4	23	30	27
Sub-total	2,068	3,080	3,717	2,430	2,265	1,704	2,466	2,687
Capital expenditures	2	3	4	13	3	10	2	-
Related scientific activities:								
Current expenditures	12,781	11,693	13,386	17,582	25,604	27,394	27,620	28,153
Capital expenditures	6	188	171	92	39	205	81	28
Total	14,857	14,964	17,278	20,117	27,911	29,313	30,169	30,868

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TABLE 42. Total Expenditures in the Social Sciences and Humanities, by Department or Agency, 1977-78 to 1984-85(e)

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Advanced Education	...	...	...	...	...	...	1,354	1,723
Advanced Education & Manpower.	834	2,408	2,075	1,920	2,344	2,612	...	...
Agricultural Research Trust ..	...	20	-	-	-	-	-	-
Alcoholism & Drug Abuse Commission	232	248	282	375	497	264	320	290
Attorney General	299	238	260	290	290	290	436	407
Business Development & Tourism	3,246	...	...	...	...	...	...	...
Consumer & Corporate Affairs	90	62	75	89	120	143	172	167
Culture	2,051(e)	1,142	1,642	1,729	2,332(e)	2,255	3,036	3,036
Economic Development	...	2,117	3,125	3,484	5,857	4,093	3,374	3,400
Education	1,450	1,932	2,114	2,414	3,050	3,617(e)	2,724	3,479
Educational Communications Corporation ACCESS	-	263	215	165	182(e)	200(e)	398	405
Energy & Natural Resources ...	22	-	-	-	-	-	-	-
Environment	270	250	590	253	557	508	232	255
Environment Council	788	930	788	1,289	1,321	1,243	1,525	1,339
Hospitals & Medical Care	1,357	1,142	1,030	1,792	2,091	2,637	2,460	3,493
Housing	975	390	420	324	480	805	739	944

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TABLE 42. Total Expenditures in the Social Sciences and Humanities, by Department or Agency, 1977-78 to 1984-85(e) - Concluded

Department or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Labour	219	266	379	353	462	557	564	504
Manpower	...	...	...	...	...	...	1,539	1,534
Mental Health Research Fund	...	122	158	355	183	193	345	345
Municipal Affairs	125	399	258	364	1,184	1,408	1,577	1,677
Recreation & Parks	...	--	182	283	306	511	207	140
Recreation, Parks & Wildlife	282(e)	...	...	...	...	...	...	...
Social Services & Community Health	725	535	630	733	933	100	270	290
Solicitor General	267	257	35	183	1,754	3,478	4,434	3,000
Tourism & Small Business	...	517	1,046	1,451	1,246	1,597	1,058	1,060
Transportation	-	-	-	-	-	-	377	272
Treasury	1,625	1,161	1,426	1,868	2,085	1,994	2,097	2,155
Workers' Compensation Board	-	165	-	-	-	-	-	-
Workers' Health, Safety & Compensation	...	400	548	403	637	808	931	953
Total	14,857	14,964	17,278	20,117	27,911	29,313	30,169	30,868

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TABLE 43. Total Expenditures in the Social Sciences and Humanities, by Performer, 1977-78 to 1984-85(e)

Performer	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Intramural	9,383	9,382	11,086	13,355	17,991	16,871	17,578	19,563
Industry	3,151	2,172	3,032	4,088	7,158	9,050	8,540	7,008
Universities	321	1,708	1,901	1,597	1,637	1,859	1,658	1,938
Hospitals and health organizations	805	687	468	183	171	111	213	217
Alberta Research Council	-	-	-	2	5	5	5	5
Other	1,197	1,015	791	892	949	1,417	2,175	2,137
Total	**14,857**	**14,964**	**17,278**	**20,117**	**27,911**	**29,313**	**30,169**	**30,868**

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TABLE 44. Current Expenditures on R&D in the Social Sciences and Humanities, by Performer, 1977-78 to 1984-85(e)

Performer	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Intramural	855	957	1,084	831	669	290	681	693
Industry	494	620	832	491	440	521	423	557
Universities	281	893	1,161	751	756	643	1,023	1,068
Hospitals and health organizations	130	254	213	178	171	111	213	217
Alberta Research Council	-	-	-	2	5	5	5	5
Other	308	356	427	177	224	134	121	147
Total	**2,068**	**3,080**	**3,717**	**2,430**	**2,265**	**1,704**	**2,466**	**2,687**

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TABLE 45. Current Expenditures on R&D in the Social Sciences and Humanities, by Department or Agency, 1977-78 to 1984-85(e)

Departement or Agency	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85(e)
	($'000)							
Advanced Education	-	320	550	-	-	-	19	65
Agricultural Research Trust ..	...	20	-	-	-	-	-	-
Alcoholism & Drug Abuse Commission	-	57	93	118	7	7	1	1
Attorney General	219	238	260	290	290	290	436	407
Business Development & Tourism	14	...	...	...	...	...	...	...
Consumer & Corporate Affairs .	45	-	-	-	-	-	-	-
Culture	-	157	363	377	594(e)	296	773	773
Education	1,020	1,203	1,137	438	381	285(e)	300	383
Educational Communications Corporation ACCESS	-	-	5	5	6(e)	7(e)	-	-
Environment	-	250	483	41	45	-	-	-
Hospitals & Medical Care	136	144	227	143	446	111	111	111
Housing	-	-	-	37	100	385	-	130
Manpower	...	...	...	...	...	...	90	100
Mental Health Research Fund ..	...	122	144	355	183	193	345	345
Municipal Affairs	102	322	166	220	105	68	53	12
Recreation & Parks	...	--	-	-	-	-	-	-
Recreation, Parks & Wildlife	4(e)	...	...	...	...	...	...	
Social Services & Community Health	308	76	84	93	-	-	-	...
Solicitor General	-	-	35	24	-	-	-	-
Tourism & Small Business	...	-	-	79	-	-	-	-
Treasury	220	35	48	203	61	-	-	-
Workers' Compensation Board ..	-	36	-	-	-	-	-	-
Workers' Health, Safety & Compensation	...	100	122	7	47	62	338	360
Total	2,068	3,080	3,717	2,430	2,265	1,704	2,466	2,687

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TABLE 46. Total Expenditures in the Social Sciences and Humanities, by Sources of Funds, 1983-84

Department or Agency	Departmental budget	Transfers from other departments	Transfers from federal government	Trust funds	Other sources	Total
	($'000)					
Advanced Education	1,354	-	-	-	-	1,354
Alcoholism & Drug Abuse Commission	320	-	-	-	-	320
Attorney General	436	-	-	-	-	436
Consumer & Corporate Affairs .	158	14	-	-	-	172
Culture	2,927	101	8	-	-	3,036
Economic Development	3,374	-	-	-	-	3,374
Education	2,655	-	69	-	-	2,724
Educational Communications Corporation ACCESS	380	18	-	-	-	398
Environment	131	-	-	101	-	232
Environment Council	1,525	-	-	-	-	1,525
Hospitals & Medical Care	2,456	4	-	-	-	2,460
Housing	739	-	-	-	-	739
Labour	564	-	-	-	-	564
Manpower	1,539	-	-	-	-	1,539
Mental Health Research Fund ..	-	345	-	-	-	345
Municipal Affairs	1,577	-	-	-	-	1,577
Recreation & Parks	144	-	-	-	63	207
Social Services & Community Health	270	-	-	-	-	270
Solicitor General	4,434	-	-	-	-	4,434
Tourism & Small Business	1,058	-	-	-	-	1,058
Transportation	377	-	-	-	-	377
Treasury	2,097	-	-	-	-	2,097
Workers' Health, Safety & Compensation	111	-	-	397	423	931
Total	**28,626**	**482**	**77**	**498**	**486**	**30,169**

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TABLE 47. Total Expenditures in the Social Sciences and Humanities, by Activity and Performer, 1983-84

Activity	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Research and development:							
Current expenditures:							
In-house	657	-	-	-	-	-	657
Contracts	24	423	-	-	-	104	551
Grants	-	-	993	213	5	17	1,228
Research fellowships	-	-	30	-	-	-	30
Sub-total	681	423	1,023	213	5	121	2,466
Capital expenditures	2	-	-	-	-	-	2
Related scientific activities:							
Current expenditures	16,814	8,117	635	-	-	2,054	27,620
Capital expenditures	81	-	-	-	-	-	81
Total	**17,578**	**8,540**	**1,658**	**213**	**5**	**2,175**	**30,169**

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TABLE 48. Total Expenditures in the Social Sciences and Humanities, by Department or Agency and Performer, 1983-84

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Advanced Education	401	30	626	1	-	296	1,354
Alcoholism & Drug Abuse Commission	212	108	-	-	-	-	320
Attorney General	-	-	436	-	-	-	436
Consumer & Corporate Affairs .	172	-	-	-	-	-	172
Culture	1,796	1,129	-	-	-	111	3,036
Economic Development	1,600	1,774	-	-	-	-	3,374
Education	1,239	770	-	-	5	710	2,724
Educational Communications Corporation ACCESS	274	124	-	-	-	-	398
Environment	15	192	-	-	-	25	232
Environment Council	1,525	-	-	-	-	-	1,525
Hospitals & Medical Care	1,647	-	-	111	-	702	2,460
Housing	671	68	-	-	-	-	739
Labour	479	-	-	-	-	85	564
Manpower	1,420	115	4	-	-	-	1,539
Mental Health Research Fund ..	-	-	231	101	-	13	345
Municipal Affairs	1,351	149	-	-	-	77	1,577
Recreation & Parks	63	98	23	-	-	23	207
Social Services & Community Health	270	-	-	-	-	-	270
Solicitor General	1,259	3,175	-	-	-	-	4,434
Tourism & Small Business	509	532	-	-	-	17	1,058
Transportation	-	261	-	-	-	116	377
Treasury	2,097	-	-	-	-	-	2,097
Workers' Health, Safety & Compensation	578	15	338	-	-	-	931
Total	**17,578**	**8,540**	**1,658**	**213**	**5**	**2,175**	**30,169**

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TABLE 49. Current Expenditures on R&D in the Social Sciences and Humanities, by Department or Agency and Performer, 1983-84

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Advanced Education	-	-	18	1	-	-	19
Alcoholism & Drug Abuse Commission	1	-	-	-	-	-	1
Attorney General	-	-	436	-	-	-	436
Culture	426	323	-	-	-	24	773
Education	206	10	-	-	5	79	300
Hospitals & Medical Care	-	-	-	111	-	-	111
Manpower	-	90	-	-	-	-	90
Mental Health Research Fund	-	-	231	101	-	13	345
Municipal Affairs	48	-	-	-	-	5	53
Workers' Health, Safety & Compensation	-	-	338	-	-	-	338
Total	681	423	1,023	213	5	121	2,466

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TABLE 50. Application of Expenditures in the Social Sciences and Humanities, by Department or Agency, 1983-84

Department or Agency	Advancement of science	Communi-cations	Energy and fuels		Environmental issues
			Fossil fuels	Other	
	($'000)				
Advanced Education	-	-	-	-	-
Alcoholism & Drug Abuse Commission	-	-	-	-	-
Attorney General	-	-	-	-	-
Consumer & Corporate Affairs .	-	-	-	-	-
Culture	155	-	-	-	-
Economic Development	-	-	-	-	-
Education	-	-	-	-	-
Educational Communications Corporation ACCESS	-	-	-	-	-
Environment	-	-	-	-	99
Environment Council	-	-	-	-	1,525
Hospitals & Medical Care	-	-	-	-	-
Housing	-	-	-	-	-
Labour	-	-	-	-	-
Manpower	-	-	-	-	-
Mental Health Research Fund ..	-	-	-	-	-
Municipal Affairs	-	-	-	-	-
Recreation & Parks	-	-	-	-	-
Social Services & Community Health	-	-	-	-	
Solicitor General	-	-	-	-	-
Tourism & Small Business	-	-	-	-	30
Transportation	-	-	-	-	-
Treasury	-	-	-	-	-
Workers' Health, Safety & Compensation	-	-	-	-	-
Total	155	-	-	-	1,654

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TABLE 50. Application of Expenditures in the Social Sciences and Humanities, by Department or Agency, 1983-84 - Continued

Department or Agency	Health	Industrial and economic development					
		Agriculture	Fisheries	Forestry	Manufacturing	Minerals	Other
	($'000)						
Advanced Education	19	-	-	-	-	-	-
Alcoholism & Drug Abuse Commission	320	-	-	-	-	-	-
Attorney General	-	-	-	-	-	-	-
Consumer & Corporate Affairs .	-	-	-	-	-	-	-
Culture	-	-	-	-	-	-	64
Economic Development	-	58	-	79	1,659	-	457
Education	-	-	-	-	-	-	-
Educational Communications Corporation ACCESS	-	-	-	-	-	-	-
Environment	-	-	-	-	-	-	133
Environment Council	-	-	-	-	-	-	-
Hospitals & Medical Care	2,460	-	-	-	-	-	-
Housing	-	-	-	-	-	-	-
Labour	-	-	-	-	-	-	-
Manpower	-	-	-	-	-	-	-
Mental Health Research Fund ..	345	-	-	-	-	-	-
Municipal Affairs	-	-	-	-	-	-	-
Recreation & Parks	-	-	-	-	-	-	-
Social Services & Community Health	-	-	-	-	-	-	-
Solicitor General	-	-	-	-	-	-	-
Tourism & Small Business	-	27	-	25	-	-	811
Transportation	-	-	-	-	-	-	-
Treasury	-	-	-	-	-	-	-
Workers' Health, Safety & Compensation	931	-	-	-	-	-	-
Total	4,075	85	-	104	1,659	-	1,465

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TABLE 50. Application of Expenditures in the Social Sciences and Humanities, by Department, 1983-84 - Concluded

Department or Agency	Social development and related areas					Transportation	Total
	Culture, sport and recreation	Education	Human resources	Urban and regional studies	Other		
	($'000)						
Advanced Education	-	1,290	-	45	-	-	1,354
Alcoholism & Drug Abuse Commission	-	-	-	-	-	-	320
Attorney General	-	-	-	-	436	-	436
Consumer & Corporate Affairs .	-	-	-	-	172	-	172
Culture	-	24	-	50	2,743	-	3,036
Economic Development	-	-	-	-	-	1,121	3,374
Education	-	2,724	-	-	-	-	2,724
Educational Communications Corporation ACCESS	-	398	-	-	-	-	398
Environment	-	-	-	-	-	-	232
Environment Council	-	-	-	-	-	-	1,525
Hospitals & Medical Care	-	-	-	-	-	-	2,460
Housing	-	-	-	739	-	-	739
Labour	-	-	479	-	85	-	564
Manpower	-	-	1,539	-	-	-	1,539
Mental Health Research Fund ..	-	-	-	-	-	-	345
Municipal Affairs	-	-	-	1,577	-	-	1,577
Recreation & Parks	205	-	-	-	2	-	207
Social Services & Community Health	-	-	-	-	270	-	270
Solicitor General	-	-	-	-	4,434	-	4,434
Tourism & Small Business	-	60	30	75	-	-	1,058
Transportation	-	-	-	217	-	160	377
Treasury	-	-	-	-	2,097	-	2,097
Workers' Health, Safety & Compensation	-	-	-	-	-	-	931
Total	**205**	**4,496**	**2,048**	**2,703**	**10,239**	**1,281**	**30,169**

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TABLE 51. Application of Expenditures in the Social Sciences and Humanities, by Activity, 1983-84

Application	Intramural		Extramural		Total
	Research and development	Related scientific activities	Research and development	Related scientific activities	
	($'000)				
Advancement of science	-	-	155	-	155
Communications	-	-	-	-	-
Energy and fuels:					
Fossil fuels	-	-	-	-	-
Other	-	-	-	-	-
Environmental issues	-	1,539	-	115	1,654
Health	1	2,436	813	825	4,075
Industrial and economic development:					
Agriculture	-	10	-	75	85
Fisheries	-	-	-	-	-
Forestry	-	55	-	49	104
Manufacturing	-	900	-	759	1,659
Minerals	-	-	-	-	-
Other	64	670	-	731	1,465
Social development and related areas:					
Culture, sport and recreation .	-	63	-	142	205
Education	208	1,731	118	2,439	4,496
Human resources	-	1,899	90	59	2,048
Urban and regional studies	48	1,974	55	626	2,703
Other	362	5,168	554	4,155	10,239
Transportation	-	450	-	831	1,281
Other	-	-	-	-	-
Total	**683**	**16,895**	**1,785**	**10,806**	**30,169**

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TABLE 52. Extramural R&D Expenditures in the Social Sciences and Humanities, by Sector of Performance and Application, 1983-84

Application	Industry	Universities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)					
Advancement of science	155	-	-	-	-	155
Communications	-	-	-	-	-	-
Energy and fuels:						
Fossil fuels	-	-	-	-	-	-
Other	-	-	-	-	-	-
Environmental issues	-	-	-	-	-	-
Health	-	587	213	-	13	813
Industrial and economic development:						
Agriculture	-	-	-	-	-	-
Fisheries	-	-	-	-	-	-
Forestry	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Minerals	-	-	-	-	-	-
Other	-	-	-	-	-	-
Social development and related areas:						
Culture, sport and recreation .	-	-	-	-	-	-
Education	10	-	-	5	103	118
Human resources	90	-	-	-	-	90
Urban and regional studies	50	-	-	-	5	55
Other	118	436	-	-	-	554
Transportation	-	-	-	-	-	-
Other	-	-	-	-	-	-
Total	423	1,023	213	5	121	1,785

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TABLE 53. Departmental Personnel Engaged in Social Science Activities, by Department or Agency, 1983-84

Department or Agency	Research and development				Related scientific activities			
	Scientific and professional	Technical	Other	Total	Scientific and professional	Technical	Other	Total
	(person-years)							
Advanced Education	...	...	...	...	14	-	1	15
Alcoholism & Drug Abuse Commission	...	...	...	...	3	2	1	6
Attorney General	...	...	...	...	-	-	-	-
Consumer & Corporate Affairs	...	...	...	...	4	-	2	6
Culture	11	-	2	13	32	5	17	54
Economic Development	...	...	...	...	65	-	10	75
Education	4	-	2	6	10	2	10	22
Educational Communications Corporation ACCESS	...	...	...	...	...	...	...	...
Environment	-	-	-	-	5	1	-	6
Environment Council	...	...	...	...	17	3	12	32
Hospitals & Medical Care	...	...	...	...	15	6	12	33
Housing	...	...	...	...	7	1	3	11
Labour	...	...	...	...	8	2	6	16
Manpower	...	...	...	...	29	-	11	40
Municipal Affairs	1	-	1	2	20	2	8	30
Recreation & Parks	...	...	...	...	1	1	-	2
Social Services & Community Health	...	...	...	...	8	2	-	10
Solicitor General	...	...	...	...	14	18	7	39
Tourism & Small Business	...	...	...	...	13	3	5	21
Treasury	...	...	...	...	27	4	24	55
Workers' Health, Safety & Compensation	...	...	...	...	6	4	2	12
Total	16	-	5	21	298	56	131	485

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TABLE 54. Total Expenditures in the Social Sciences and Humanities, by Activity and Performer, 1984-85(e)

Activity	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Research and development:							
Current expenditures:							
In-house	674	-	-	-	-	-	674
Contracts	19	427	10	-	-	130	586
Grants	-	130	1,031	217	5	17	1,400
Research fellowships	-	-	27	-	-	-	27
Sub-total	693	557	1,068	217	5	147	2,687
Capital expenditures	-	-	-	-	-	-	-
Related scientific activities:							
Current expenditures	18,842	6,451	870	-	-	1,990	28,153
Capital expenditures	28	-	-	-	-	-	28
Total	19,563	7,008	1,938	217	5	2,137	30,868

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TABLE 55. Total Expenditures in the Social Sciences and Humanities, by Department or Agency and Performer, 1984-85(e)

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Advanced Education	462	30	860	5	-	366	1,723
Alcoholism & Drug Abuse Commission	212	78	-	-	-	-	290
Attorney General	-	-	407	-	-	-	407
Consumer & Corporate Affairs .	167	-	-	-	-	-	167
Culture	1,796	1,129	-	-	-	111	3,036
Economic Development	1,600	1,800	-	-	-	-	3,400
Education	1,572	926	60	-	5	916	3,479
Educational Communications Corporation ACCESS	255	150	-	-	-	-	405
Environment	23	-	-	-	-	232	255
Environment Council	1,339	-	-	-	-	-	1,339
Hospitals & Medical Care	3,242	-	-	111	-	140	3,493
Housing	678	266	-	-	-	-	944
Labour	504	-	-	-	-	-	504
Manpower	1,377	157	-	-	-	-	1,534
Mental Health Research Fund ..	-	-	231	101	-	13	345
Municipal Affairs	1,513	107	-	-	-	57	1,677
Recreation & Parks	60	30	20	-	-	30	140
Social Services & Community Health	290	-	-	-	-	-	290
Solicitor General	1,200	1,800	-	-	-	-	3,000
Tourism & Small Business	540	500	-	-	-	20	1,060
Transportation	-	20	-	-	-	252	272
Treasury	2,155	-	-	-	-	-	2,155
Workers' Health, Safety & Compensation	578	15	360	-	-	-	953
Total	**19,563**	**7,008**	**1,938**	**217**	**5**	**2,137**	**30,868**

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TABLE 56. Current Expenditures on R&D in the Social Sciences and Humanities, by Department or Agency and Performer, 1984-85(e)

Department or Agency	Intra-mural	Industry	Univer-sities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)						
Advanced Education	-	-	60	5	-	-	65
Alcoholism & Drug Abuse Commission	1	-	-	-	-	-	1
Attorney General	-	-	407	-	-	-	407
Culture	426	323	-	-	-	24	773
Education	254	4	10	-	5	110	383
Hospitals & Medical Care	-	-	-	111	-	-	111
Housing	-	130	-	-	-	-	130
Manpower	-	100	-	-	-	-	100
Mental Health Research Fund ..	-	-	231	101	-	13	345
Municipal Affairs	12	-	-	-	-	-	12
Workers' Health, Safety & Compensation	-	-	360	-	-	-	360
Total	693	557	1,068	217	5	147	2,687

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TABLE 57. Application of Expenditures in the Social Sciences and Humanities, by Department or Agency, 1984-85(e)

Department or Agency	Advancement of science	Communications	Energy and fuels		Environmental issues
			Fossil fuels	Other	
	($'000)				
Advanced Education	-	-	-	-	-
Alcoholism & Drug Abuse Commission	-	-	-	-	-
Attorney General	-	-	-	-	-
Consumer & Corporate Affairs .	-	-	-	-	-
Culture	155	-	-	-	-
Economic Development	-	-	-	-	-
Education	-	-	-	-	-
Educational Communications Corporation ACCESS	-	-	-	-	-
Environment	-	-	-	-	20
Environment Council	-	-	-	-	1,339
Hospitals & Medical Care	-	-	-	-	-
Housing	-	-	-	-	-
Labour	-	-	-	-	-
Manpower	-	-	-	-	-
Mental Health Research Fu[illegible] ..	-	-	-	-	-
Municipal Affairs	-	-	-	-	-
Recreation & Parks	-	-	-	-	-
Social Services and Commu[illegible] Health	-	-	-	-	-
Solicitor General	-	-	-	-	-
Tourism & Small Business	-	-	-	-	-
Transportation	-	-	-	-	20
Treasury	-	-	-	-	-
Workers' Health, Safety & Compensation	-	-	-	-	-
Total	155	-	-	-	1,379

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TABLE 57. Application of Expenditures in the Social Sciences and Humanities, by Department or Agency, 1984-85(e) - Continued

Department or Agency	Health	Industrial and economic development					
		Agriculture	Fisheries	Forestry	Manufacturing	Minerals	Other
	($'000)						
Advanced Education	65	-	-	-	-	-	-
Alcoholism & Drug Abuse Commission	290	-	-	-	-	-	-
Attorney General	-	-	-	-	-	-	-
Consumer & Corporate Affairs .	-	-	-	-	-	-	-
Culture	-	-	-	-	-	-	64
Economic Development	-	60	-	80	1;660	-	460
Education	-	-	-	-	-	-	-
Educational Communications Corporation ACCESS	-	-	-	-	-	-	-
Environment	-	-	-	-	-	-	235
Environment Council	-	-	-	-	-	-	-
Hospitals & Medical Care	3,493	-	-	-	-	-	-
Housing	-	-	-	-	-	-	-
Labour	-	-	-	-	-	-	-
Manpower	-	-	-	-	-	-	-
Mental Health Research Fund ..	345	-	-	-	-	-	-
Municipal Affairs	-	-	-	-	-	-	-
Recreation & Parks	-	-	-	-	-	-	-
Social Services and Community Health	-	-	-	-	-	-	-
Solicitor General	-	-	-	-	-	-	-
Tourism & Small Business	10	-	30	-	-	-	860
Transportation	-	-	-	-	-	-	-
Treasury	-	-	-	-	-	-	-
Workers' Health, Safety & Compensation	953	-	-	-	-	-	-
Total	**5,156**	**60**	**30**	**80**	**1,660**	-	**1,619**

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TABLE 57. Application of Expenditures in the Social Sciences and Humanities, by Department or Agency, 1984-85(e) - Concluded

Department or Agency	Social development and related areas					Transpor-tation	Total
	Culture, sport and recreation	Education	Human resources	Urban and regional studies	Other		
	($'000)						
Advanced Education	-	1,593	-	65	-	-	1,723
Alcoholism & Drug Abuse Commission	-	-	-	-	-	-	290
Attorney General	-	-	-	-	407	-	407
Consumer & Corporate Affairs .	-	-	-	-	167	-	167
Culture	-	24	-	50	2,743	-	3,036
Economic Development	-	-	-	-	-	1,140	3,400
Education	-	3,479	-	-	-	-	3,479
Educational Communications Corporation ACCESS	-	405	-	-	-	-	405
Environment		-	-	-	-	-	255
Environment Council	-	-	-	-	-	-	1,339
Hospitals & Medical Care	-	-	-	-	-	-	3,493
Housing	-	-	-	944	-	-	944
Labour	-	-	504	-	-	-	504
Manpower	-	-	1,534	-	-	-	1,534
Mental Health Research Fund ..	-	-	-	-	-	-	345
Municipal Affairs	-	-	-	1,677	-	-	1,677
Recreation & Parks	140	-	-	-	-	-	140
Social Services and Community.	-	-	-	-	290	-	290
Solicitor General	-	-	-	-	3,000	-	3,000
Tourism & Small Business	-	50	-	90	-	-	1,060
Transportation	-	-	-	143	-	129	272
Treasury	-	-	-	-	2,155	-	2,155
Workers' Health, Safety & Compensation	-	-	-	-	-	-	953
Total	140	5,551	2,038	2,969	8,762	1,269	30,868

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TABLE 58. Application of Expenditures in the Social Sciences and Humanities, by Activity, 1984-85(e)

Application	Intramural		Extramural		Total
	Research and development	Related scientific activities	Research and development	Related scientific activities	
	($'000)				
Advancement of science	-	-	155	-	155
Communications	-	-	-	-	-
Energy and fuels:					
Fossil fuels	-	-	-		-
Other	-	-	-		-
Environmental issues	-	1,339	-	40	1,379
Health	1	4,041	881	233	5,156
Industrial and economic development:					
Agriculture	-	-	-	60	60
Fisheries	-	10	-	20	30
Forestry	-	50	-	30	80
Manufacturing	-	900	-	760	1,660
Minerals	-	-	-	-	-
Other	64	713	-	842	1,619
Social development and related areas:					
Culture, sport and recreation	-	60	-	80	140
Education	254	2,055	153	3,089	5,551
Human resources	-	1,881	100	57	2,038
Urban and regional studies	12	2,189	180	588	2,969
Other	362	5,182	525	2,693	8,762
Transportation	-	450	-	819	1,269
Other	-	-	-	-	-
Total	**693**	**18,870**	**1,994**	**9,311**	**30,868**

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TABLE 59. Extramural R&D Expenditures in the Social Sciences and Humanities, by Sector of Performance and Application, 1984-85(e)

Application	Industry	Universities	Hospitals and health organizations	Alberta Research Council	Other	Total
	($'000)					
Advancement of science	155	-	-	-	-	155
Communications	-	-	-	-	-	-
Energy and fuels:						
Fossil fuels	-	-	-	-	-	-
Hydro electric energy	-	-	-	-	-	-
Nuclear energy	-	-	-	-	-	-
Other	-	-	-	-	-	-
Environmental issues	-	-	-	-	-	-
Health	-	651	217	-	13	881
Industrial and economic development:						
Agriculture	-	-	-	-	-	-
Fisheries	-	-	-	-	-	-
Forestry	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Minerals	-	-	-	-	-	-
Other	-	-	-	-	-	-
Social development and related areas:						
Culture, sport and recreation	-	-	-	-	-	-
Education	4	10		5	134	153
Human resources	100	-	-	-	-	100
Urban and regional studies	180	-	-	-	-	180
Other	118	407	-	-	-	525
Transportation	-	-	-	-	-	-
Other	-	-	-	-	-	-
Total	557	1,068	217	5	147	1,994

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TABLE 60. Departmental Personnel Engaged in Social Science Activities, by Department or Agency, 1984-85(e)

Department or Agency	Research and development				Related scientific activities			
	Scientific and professional	Technical	Other	Total	Scientific and professional	Technical	Other	Total
	(person-years)							
Advanced Education	...	...	...	...	16	-	2	18
Alcoholism & Drug Abuse Commission	...	...	...	...	3	2	1	6
Attorney General	...	...	...	...	...	...	...	...
Consumer & Corporate Affairs	...	...	...	...	4	-	1	5
Culture	11	-	2	13	32	5	17	54
Economic Development	...	...	...	...	65	-	10	75
Education	5	-	2	7	11	2	10	23
Educational Communications Corporation ACCESS	...	...	...	...	5	1	-	6
Environment	...	...	...	...	...	...	...	...
Environment Council	...	...	...	...	15	3	11	29
Hospitals & Medical Care	...	...	...	...	16	5	11	32
Housing	...	...	...	...	8	1	2	11
Labour	...	...	...	...	9	2	6	17
Manpower	...	...	...	...	29	-	13	42
Mental Health Research Fund	...	...	...	...	...	...	...	...
Municipal Affairs	-	-	1	1	23	2	8	33
Recreation & Parks	...	...	...	...	2	-	-	2
Social Services & Community Health	...	...	...	...	8	2	-	10
Solicitor General	...	...	...	...	14	17	7	38
Tourism & Small Business	...	...	...	...	11	6	6	23
Transportation	...	...	...	...	...	...	...	...
Treasury	...	...	...	...	27	4	22	53
Workers' Health, Safety & Compensation	...	...	...	...	6	4	2	12
Total	16	-	5	21	304	56	129	489

APPENDIX

DEFINITIONS

This report covers those scientific and technological activities which involve the generation, dissemination and application of new scientific and technological knowledge. The central activity is research and experimental development (R&D). In addition, there are a number of related scientific activities (RSA) which are considered in less detail.

R&D is creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications. It requires the acquistion of knowledge and not just information. New knowledge involves the integration of newly acquired information into existing hypotheses, the formulation and testing of new hypotheses or the re-evaluation of existing observations.

The major related scientific activities (**RSA**) are technical surveys, statistical surveys, information services, special services and studies, and museum services. Statistical surveys, information services and museum services are largely self-explanatory the other two are described below.

Technical surveys are activities directed towards the exploration and systematic description of the earth and its natural resources. The activities include the gathering, processing, collating and analyzing of data on natural phenomena except when part of a research project or a museum service. The preparation of maps and survey reports, their printing and cataloguing, are also included.

Special services and studies in the natural sciences are activities directed towards the establishment of national and provincial standards for materials, devices, products and processes; the calibration of secondary standards; non-routine quality testing; feasibility studies and demonstration projects. In the social sciences, special services and studies are systematic investigations carried out in order to provide information needed for planning or policy formulation, including feasibility studies, and demonstration projects.

Activities are either natural sciences or social sciences and humanities. **Natural sciences** consist of disciplines concerned with the understanding, exploring, developing or utilizing the natural world. Included are the engineering, mathematical, environmental, life and physical sciences. **Social sciences and humanities** include all disciplines involving the study of human actions and conditions and the social, economic and institutional mechanisms affecting humans. Included are such disciplines as anthropology, business administration and commerce, communications, criminology, demography, economics, geography, history, languages, literature and linguistics, law, library science, philosophy, political science, psychology, religious studies, social work, sociology and urban and regional studies.

DEFINITIONS - Concluded

Five **performing sectors** are identified besides the Alberta Research Council. Intramural refers to the provincial ministry or agency performing a scientific activity. Industry consists principally of private corporations but also includes crown corporations with a commercial function (e.g., power utilities) and industrial research institutes not controlled by another sector. Universities cover postsecondary educational institutions and affiliated teaching and research facilities. Hospitals and health organizations are health organizations such as the Heart Foundation and hospitals which do not belong to the university sector. Other includes non-resident performers of scientific activities funded by the provincial government, as well as recipients not covered elsewhere such as the Federal Government, other provincial ministries and individuals.

Expenditures are either current or capital. **Current expenditures** include those costs for personnel, transportation and communications, information, professional and special services, rentals, purchased repair and upkeep, utilities, materials and supplies. **Capital expenditures** are those on the construction and acquisition of land, buildings, machinery and equipment. Total expenditures include current plus capital.

Alberta Departments Included in the Provincial Government Science Survey

1974-75	1975-76	1976-77	1977-78	1978-79
Advanced Education	Advanced Education & Manpower	Advanced Education & Manpower	Advanced Education & Manpower	Advanced Education & Manpower
Agriculture (e)	Agriculture (e)	Agriculture (e)	Agriculture	Agriculture
				Agricultural Research Trust
			Alcoholism & Drug Abuse Commission	Alcoholism & Drug Abuse Commission
	Attorney General	Attorney General	Attorney General	Attorney General
Business Development & Tourism	Business Development & Tourism	Business Development & Tourism	Business Development & Tourism	
Consumer & Corporate Affairs	Consumer & Corporate Affairs	Consumer & Corporate Affairs	Consumer & Corporate Affairs	Consumer & Corporate Affairs
Culture, Youth & Recreation	Culture (e)	Culture	Culture	Culture
				Economic Development
Education (e)	Education	Education	Education	Education
	Educational Communications Corporation	Educational Communications Corporation	Educational Communications Corporation	Education Communications Corporation
Energy Resources Conservation Board	Energy and Natural Resources	Energy and Natural Resources	Energy and Natural Resources	Energy and Natural Resources
Environment	Environment	Environment	Environment	Environment

Alberta Departments Included in the Provincial Government Science Survey - continued

1979-80	1980-81	1981-82	1982-83	1983-1984
Advanced Education & Manpower	Advanced Education & Manpower	Advanced Education & Manpower	Advanced Education & Manpower	Advanced Education
Agriculture	Agriculture	Agriculture	Agriculture	Agriculture
Agricultural Research Trust	Agricultural Research Trust	Agricultural Research Trust	Agricultural Research Trust	Agriculture Research Trust
Alcoholism & Drug Abuse Commission	Alcoholism & Drug Abuse Commission	Alcoholism & Drug Abuse Commission	Alcoholism & Drug Abuse Commission	Alcoholism & Drug Abuse Commission
Attorney General	Attorney General	Attorney General	Attorney General	Attorney General
Consumer & Corporate Affairs	Consumer & Corporate Affairs	Consumer & Corporate Affairs	Consumer & Corporate Affairs	Consumer & Corporate Affairs
Culture	Culture	Culture	Culture	Culture
Economic Development	Economic Development	Economic Development	Economic Development	Economic Development
Education	Education	Education	Education	Education
Education Communications Corporation	Education Communications Corporation	Education Communications Corp. ACCESS	Education Communications Corp. ACCESS	Education Communications corp. ACCESS
Energy and Natural Resources	Energy and Natural Resources	Energy and Natural Resources	Energy and Natural Resources	Energy and Natural Resources
Environment	Environment	Environment	Environment	Environment
	Environment Centre	Environment Centre	Environment Centre	Environment Centre

Alberta Departments included in the Provincial Government Science Survey - continued

1974-75	1975-76	1976-77	1977-78	1978-79
Environment Conservation Authority	Environment Conservation Authority	Environment Conservation Authority	Environment Council (e)	Environment Council
				Executive Council
Health Care Insurance Commission	Health Care Insurance Commission	Health Care Insurance Commission		
			Hospitals & Medical Care	Hospitals & Medical Care
Hospital Services Commission	Hospital Services Commission	Hospital Services Commission		
Housing Corporation	Housing Corporation			
Housing & Public Works	Housing & Public Works	Housing & Public Works	Housing & Public Works	Housing and Public Works
	Labour (5 month report)	Labour	Labour	Labour
Lands & Forests (e)				
Manpower & Labour				
				Mental Health Research Fund
Mines & Minerals				
Municipal Affairs	Municipal Affairs	Municipal Affairs	Municipal Affairs	Municipal Affairs
Northern Development				
Office of Program Co-ordinator				
		Oil Sands Technology & Research Authority	Oil Sands Technology & Research Authority	Oil Sands Technology & Research Authority
	Recreation, Parks & Wildlife	Recreation, Parks & Wildlife	Recreation, Parks & Wildlife	Recreation & Parks (unavailable)

Alberta Departments included in the Provincial Government Science Survey - continued

1979-80	1980-81	1981-82	1982-83	1983-84
Environment Council	Environment Council	Environment Council	Environment Council	Environment Council
Executive Council	Executive Council	Executive Council	Executive Council	Executive Council
Hospitals & Medical Care	Hospitals & Medical Care	Hospitals & Medical Care	Hospitals & Medical Care	Hospitals & Medical Care
Housing and Public Works	Housing and Public Works	Housing and Public Works	Housing	Housing
Labour	Labour	Labour	Labour	Labour
				Manpower
Mental Health Research Fund	Mental Health Research Fund	Mental Health Research Fund	Mental Health Research Fund	Mental Health Research Fund
Municipal Affairs	Municipal Affairs	Municipal Affairs	Municipal Affairs	Municipal Affairs
Oil Sands Technology & Research Authority	Oil Sands Technology & Research Authority	Oil Sands Technology & Research Authority	Oil Sands Technology & Research Authority	Oil Sands Technology & Research Authority
Recreation & Parks	Recreation & Parks	Recreation & Parks	Recreation & Parks	Recreation & Parks

Alberta Departments Included in the Provincial Government Science Survey - concluded

1974-75	1975-76	1976-77	1977-78	1978-79
Social Services & Community Health	Social Services & Community Health	Social Services & Community Health (e)	Social Services & Community Health	Social Services & Community Health
Solicitor General	Solicitor General	Solicitor General	Solicitor General	Solicitor General
Task Force on Urbanization & the Future				
				Tourism & Small Business
Transportation	Transportation	Transportation	Transporation	Transportation
Treasury	Treasury	Treasury	Treasury	Treasury
Utilities & Telephones				
Workers' Compensation Board	Workers' Compensation Board	Workers' Compensation Board	Nil	Workers' Compensation Board
				Workers' Health, Safety & Compensation

Alberta Departments included in the Provincial Government Science Survey - concluded

1979-80	1980-81	1981-82	1982-83	1983-84
Social Service & Community Health	Social Services & Community Health	Social Services & Community Health	Social Services & Community Health	Social Services & Community Health
Solicitor General	Solicitor General	Solicitor General	Solicitor General	Solicitor General
Tourism & Small Business	Tourism & Small Business	Tourism & Small Business	Tourism & Small Business	Tourism & Small Business
Transportation	Transportation	Transportation	Transportation	Transportation
Treasury	Treasury	Treasury	Treasury	Treasury
Workers' Health, Safety & Compensation	Workers' Health, Safety & Compensation	Workers' Health, Safety & Compensation	Workers' Health, Safety & Compensation	Workers' Health, Safety & Compensation

RESPONDENTS
1983-84

Advanced Education - Co-ordinator: Asefa Gabregiorgis (427-4845)

Studies are carried out by the Planning Secretariat to assist the development of long range plans and policies in the area of advanced education. The other major activity is the operation of the Innovative Projects grant program to support the development and demonstration of innovative instructional techniques. R&D grants are awarded to researchers in the Alberta University and Health Organization through the Alberta Foundation for Nursing Research. In 1983-84, Advanced Education and Manpower was re-organized into two separate departments.

Agriculture Research Trust - Co-ordinator: Laraine Strafford (432-4931)

The Trust, funded by the provincial government and by industry, supports R&D projects in any aspect of agricultural and food sciences (including rural economy). Projects are carried out mainly in the Alberta universities.

Agriculture - Co-ordinator: Dr. J.P. Mahone (427-1957)

The Department operates a number of research centres in Alberta, as well as supporting agriculture related research projects undertaken by universities and provincial research organizations.

Alcoholism and Drug Abuse Commission - Co-ordinator: Art Dyer (427-4275)

The Commission carries out or funds studies required for program evaluation and development.

Attorney General - Co-ordinator: Dennis Medwid (427-4997)

The Department makes an annual research grant to the Institute of Law Research and Reform of the University of Alberta.

Consumer and Corporate Affairs - Co-ordinator: John Dunfield (427-6941)

The Research and Planning Division conducts program evaluations, policy analysis and needs assessments in support of departmental progress.

RESPONDENTS - Continued

Culture

The social sciences were reported as a composite of Historic Site Service, Archaeology Survey, Provincial Archives, Tyrell Museum of Palaeontology, Reynolds-Aberta Museum Project, Historical Resources Division and Library (Mark Rasmussen, 427-3182). The natural sciences were reported by the Natural History Sector of the Provincial Museum (Dr. Philip Stepney, 427-1731) and Natural Resources Science Centre (John Brent Musgrave, 427-9490).

Economic Development - Co-ordinator: Terry Eliuk (427-3749)

Six branches are involved in related scientific activities: Finance and Administration, Industry Development, Trade Development, Manufacturing Industries, Strategic Planning and Transportation Services. The activities undertaken and funded were surveys and special studies to provide information for economic planning and policy formation.

Education - Co-ordinator: Dr. H.I. Hastings (427-2991)

Two branches of the Department are covered: Planning Services Branch and Student Records and Computer Services Branch. The program involves chiefly issue-oriented research of a cross-sectional nature as well as studies and surveys.

ACCESS Educational Communications Corporation - Co-ordinator: Dr. M. Plumb (451-3160)

The Research and Evaluation Branch carries out or funds related scientific activities.

Energy and Natural Resources

The Scientific and Engineering Services Division (Mr. R.D. McDonald, 427-8042) supports a large volume of R&D activity, funded mainly through the Alberta/Canada Energy Resources Research Fund. Projects relate to furthering the development and use of energy resources with emphasis on coal, renewables and energy conservation.

The four other reporting areas, Alberta Forest Service (Mr. J. Soos, 962-8700), Public Lands Division (Mr. R.J. Miller, 427-0237), Fish and Wildlife Division (Mike Melnyk, 422-4771), and Resource Evaluation and Planning Division (Mr. B.B. Delaney, 427-7222), have research activities in the natural sciences.

RESPONDENTS - Continued

Environment - Co-ordinator: Martin Rehn (427-3943)

Most of the activity is in the Natural Sciences with eight divisions reporting. Research Management, Planning, Environmental Assessment, Technical Services, Earth Sciences, Reclamation Branch, Standards and Approvals, Pollution control. A small amount of activity in the social sciences is reported by the Planning and Environmental Assessment divisions.

Alberta Environmental Centre - Co-ordinator: Dr. R.S. Weaver (632-6761)

The Centre is an inter-disciplinary research and service agency which studies and solves environmental problems identified by departments and agencies of the Government of Alberta.

Environment Council of Alberta - Co-ordinator: Mr. A. Giacomazzi (427-5792)

The Research Division, works in support of environmental issues. The Administration Division offers support through library services and panels and prepares reports and recommendations as well as providing information for various public hearings and policy formulating projects.

Executive Council

Provides R&D grants and contributions to the Alberta Research Council for research in the areas of atmosphere, geology, fossil fuels, microbiology, chemistry and related engineering applications. Data are taken from the Estimates of Expenditures, 1984-85.

Hospitals and Medical Care - Co-ordinator: Dr. Y.M. Cheung (427-1420)

The Heritage Trust fund supports the cancer research performed extramurally by hospitals and health organizations and universities. The heart disease research funds are now part of the departmental budget.

In the social sciences, funding is from within the departmental budget and activities include health care programs, hospital planning and related studies.

RESPONDENTS - Continued

Housing - Co-ordinator: Linden Holmen (427-8150)

The Policy and Planning Division, composed of Policy and Program Development Branch, Market and Economic Analysis Branch and Planning and Research Branch, is involved in studies and analysis relating to the social aspects of land and housing. The Planning and Research Branch carries out and supports research in the natural sciences relating to the built environment of housing.

Labour - Co-ordinator: Janet E. Howell (427-8531)

Wages and benefits as well as other labour information is studied and analyzed and made available for policy making and planning as well as the development of safety standards.

Manpower - Co-ordinator: Ian Montgomerie (427-8501)

The prime responsibility of the Planning Secretariat is the development of long-term plans and the recommendation of policy alternatives in the area of manpower planning, training and demography.

Prior to 1983-84, the Department of Manpower was included with Advanced Education and Manpower.

Alberta Mental Health Research Fund - Co-ordinator: Dr. R.J. Dyck (427-2813)

The Fund awards grants and contributions to Universities and Hospitals and Health Organizations for health related research and development in both natural and social sciences.

Municipal Affairs - Co-ordinator: Boyd Oberhoffner (427-2225)

The Research and Development Branch is involved in urban and regional studies.

Alberta Oil Sands Technology and Research Authority - Co-ordinator: Mr. W.G. Kowaluk (427-7623)

Alberta Heritage Trust is the primary source of funds for AOSTRA which awards numerous contracts for research and development. The industrial sector receives the majority of the money with universities and the Alberta Research Council getting most of the remainder.

Recreation and Parks - Co-ordinator: Mike Boyd (422-1730)

Natural and social related scientific activities are reported by the Planning Secretariat with their major objective being social development in the area of culture, sport and recreation.

RESPONDENTS - Concluded

Social Services and Community Health - Co-ordinator: C.A. MacDonald (427-8192)

The projects mainly include systematic investigations in order to provide information for planning and policy formulation on social assistance and child welfare.

Solicitor General - Co-ordinator: David Sunuhara (427-0366)

Computer and Research Services are developing information systems and conducting research in criminal justice.

Tourism and Small Business - Co-ordinator: John Peters (427-4837)

Projects are classified as related scientific activities and involve evaluations, studies and surveys on tourism, small business and development of Northern Alberta.

Transportation - Co-ordinator: Helen Tetteh-Wayoe (422-2750)

Most projects are reported as natural sciences with only Urban Transportation Branch reporting some related scientific activities in the social sciences. This is due to the technical and engineering aspects of the work relating to transportation.

Alberta Treasury - Co-ordinator: Mr. O. DeVries (427-3058)

The Alberta Bureau of Statistics collects, compiles, analyses abstracts and publishes statistical information relative to the commercial, industrial, financial, social, economic and general activities and conditions of the province.

Workers Health, Safety and Compensation - Co-ordinator: John McDermott (427-6971)

The Heritage Trust Fund and Workers Compensation Board Assessment Revenue support a large portion of the social science projects. Related Scientific Activities in the natural sciences for the purposes of health are funded from the departmental budget.

Indicators of Provincial Scientific Activities

1. Population and Income

Province	Population January1984(1)		Personal income per capita 1982(2)		Provincial Gross Domestic Product per capita 1982(3)	
	(000)	Rank	($)	Rank	($)	Rank
Newfoundland	579	9	8,580	10	8,108	9
Prince Edward Island	125	10	8,894	9	7,945	10
Nova Scotia	866	7	10,090	7	9,582	7
New Brunswick	710	8	9,229	8	9,331	8
Quebec	6,529	2	12,021	5	12,748	6
Ontario	8,887	1	13,842	2	15,436	4
Manitoba	1,052	5	11,987	6	13,248	5
Saskatchewan	1,000	6	12,372	4	15,702	2
Alberta	2,345	4	14,025	1	22,624	1
British Columbia	2,852	3	13,811	3	15,678	3
Canada(4)	25,016		12,839		14,775	

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1) **Canadian Statistical Review**, Statistics Canada, Catalogue No. 11-003E, March 1984.
2) **National Income and Expenditure Accounts**, 1968-1982, Statistics Canada, Catalogue No. 13-201.
3) **Provincial Economic Accounts, Experimental Data**, 1967-1982, Statistics Canada, Catalogue No. 13-213.
4) Includes the Yukon and Northwest Territories.

Indicators of Provincial Scientific Activities

2. Universities

Province	Graduate students per ten thousand population (15 years and over) 1982-83(1)		Sponsored research in universities per capita, 1982-83 (2)	
		Rank	($'000)	Rank
Newfoundland	13	7	21	6
Prince Edward Island	-	10	4	10
Nova Scotia	26	4	22	5
New Brunswick	10	9	17	9
Quebec	28	2	24	4
Ontario	28	1	31	1
Manitoba	26	3	31	3
Saskatchewan	12	8	19	8
Alberta	22	5	31	2
British Columbia	20	6	20	7
Canada	25		26	

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(1) Full-time enrolment for graduate degrees, per ten thousand population (15 years and over) **Universities Enrolment and Degrees, 1982-83**, Statistics Canada, Catalogue No. 81-204, and "Postcensal Estimate of Population by Sex and Age for Canada and the Provinces" June 1982, Population Estimates Section, Demography Division, Statistics Canada.

(2) **Financial Statistics of Universities and Colleges, 1982-83**, Canadian Association of University Bus Officers.

Indicators of Provincial Scientific Activities

3. Industry

Province	Value added by manufacturing activity per capita, 1981(1)		Current intramural industrial R&D expenditures per employee in primary and secondary industry, 1982(2)	
	($)	Rank	($)	Rank
Newfoundland	951	8	--	9
Prince Edward Island	606	10	--	10
Nova Scotia	1,521	6	77	7
New Brunswick	1,454	7	67	8
Quebec	3,114	2	666	2
Ontario	4,169	1	900	1
Manitoba	1,943	4	181	6
Saskatchewan	824	9	208	5
Alberta	1,709	5	633	3
British Columbia	2,328	3	311	4
Canada(3)	2,954		662	

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(1) **Manufacturing Industries of Canada: National and Provincial Areas, 1981**, Statistics Canada, Catalogue No. 31-203.

(2) Results of 1982 Industrial R&D survey, Science and Technology Statistics Division, Statistics Canada and The **Labour Force, April, 1984**, Statistics Canada, Catalogue No. 71-001.

(3) Includes the Yukon and Northwest Territories.

Indicators of Provincial Scientific Activities

4. Federal Government

Province	Expenditures on intramural natural science activities 1982-83(1)	Federal personnel 1982-83(1)	Contracts awarded by the Science Procurement Sector, Department of Supply and Services, 1983-84(2)	
	($'000,000)	(Person-years)	No.	($'000,000)
Atlantic Provinces	157	2,432		
Quebec	98(3)	1,546(3)	818	26
Ontario	209(4)	4,407(4)	399	54
Ottawa-Hull	583	10,727	1,533	112
Manitoba	96	1,637	...	...
Saskatchewan	32	686	119	5
Alberta	64	1,308	71	6
British Columbia	88	1,673	254	14
			842	39
Canada(5)	1,328	24,452	4,060	256

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(1) **Federal Scientific Establishments, 1982-83**, Science and Technology Statistics Division, Statistics Canada.
(2) **Research and Development Bulletin**, April 1984, Supply and Services.
(3) Excluding Hull.
(4) Excluding Ottawa.
(5) Includes the Yukon and Northwest Territories.

Indicators of Provincial Scientific Activities

5. Provincial Research Organizations

Province	Total expenditures on science and technology, 1983(1)	
	($'000)	Rank
Nova Scotia	5,380	8
New Brunswick	5,870	6
Quebec	19,366	2
Ontario	18,686	3
Manitoba	5,704	7
Saskatchewan	10,294	4
Alberta	37,373	1
British Columbia	7,905	5
Total	110,578	

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(1) "The Provincial Research Organizations, 1983", **Science Statistics**, Vol. 8, No. 11, Statistics Canada, Catalogue No. 88-001.

6. Sectors Performing R&D, by Region, 1982(1)

Performing sector	Atlantic provinces	Quebec	Ontario	Alberta	Other Western provinces	Canada (2)
	($000,000)					
Federal government ...	118	107	588	59	169	1,042
Provincial government	2	23	48	23	17	113
Provincial research organizations	5	9	12	21	10	57
Total government	125	139	648	103	196	1,212
Industry	16	559	1,349	255	186	2,381
Universities	78	261	325	114	175	953
Private non-profit ...	-	14	26	2	3	45
All sectors	219	973	2,348	474	560	4,591

(1) "Gross Domestic Expenditures on R&D by Region, 1979-82", uncatalogued report. Science and Technology Statistics Division, Statistics Canada.

(2) Includes the Yukon and Northwest Territories.

NOTE: Totals may not add due to rounding.

7. Sectors Funding R&D, by Region of Performance, 1982(1)

Funding sector	Atlantic provinces	Quebec	Ontario	Alberta	Other Western provinces	Canada (2)
	($000,000)					
Federal government	153	252	873	115	261	1,655
Provincial government ..	6	78	116	76	39	313
Provincial research organizations	-	1	1	-	-	3
Total government	159	331	990	191	300	1,971
Industry	15	444	1,082	203	151	1,908
Universities	42	128	116	54	80	421
Private non-profit	2	23	44	5	12	86
Foreign	1	47	116	21	17	205
All sectors	219	973	2,348	474	560	4,591

(1) "Gross Domestic Expenditures on R&D by Region, 1979-82", uncatalogued report, Science and Technology Statistics Division, Statistics Canada.

(2) Includes the Yukon and Northwest Territories.

NOTE: Totals may not add due to rounding.

8. Gross Domestic Expenditures on Research and Development, in Alberta, 1982(1)
Natural Sciences and Engineering

Funding sector	Performing sector							
	Government							
	Federal	Provincial	PRO	Total	Industry	Universities	Private non-profits	All Sectors
	($000,000)							
Federal government	59	-	-	59	27	29	-	115
Provincial government ..	-	23	20	43	5	26	2	76
Provincial research organizations	-	-	-	-	-	-	-	-
Total government	59	23	20	102	32	55	2	191
Industry	-	-	1	1	202	-	-	203
Universities	-	-	-	-	-	54	-	54
Private non-profit	-	-	-	-	-	5	-	5
Foreign	-	-	-	-	21	-	-	21
All sectors	59	23	21	103	255	114	2	474

(1) "Gross Domestic Expenditures on R&D by Region, 1979-82", uncatalogued report, Science and Technology Statistics Division, April 1984.

NOTE: Totals may not add due to rounding.

Provincial Co-ordinators

Five provincial governments sponsored the Science and Technology Statistics Division in the collection of similar scientific activity data. Below is a list of co-ordinators for the various sponsoring departments/ministries.

Mr. D. Clarke
Co-ordinator - Science & Technology
Planning, Development Branch
Department of Commerce and Development
P.O. Box 6000
Fredericton, N.B.
E3B 5H1 Tel.: (506) 453-2489

Mr. Gordon Stokell
Policy Advisor
Provincial Secretariat for Resources
Development
Room 1605, Whitney Block
Quenn's Park
Toronto, Ontario
M7A 1A2 Tel.: (416) 965-6366

Mr. Dale W. Botting
Executive Director
Saskatchewan Science and Technology
Government Research, Science and Technology
T.C., Douglas Building
3475 Albert Street
Regina, Saskatchewan
S4S 6X6 Tel.: (306) 565-2944

Dr. Bastiaan Heemsbergen
Director
Planning Secretariat
Alberta Advanced Education
Devonian Bulding
11160 Jasper Avenue
Edmonton, Alberta
T5K 0L1 Tel.: (403) 427-4845

Mr. B. Stevenson
Director
Science and Technology Division
and Communications
3rd Floor, 756 Fort Street
Victoria, B.C.
V8V 1X4 Tel.: (604) 387-4561

Publications of the Science and Technology Statistics Division of Statistics Canada

In August 1983, Statistics Canada formed a Science and Technology Statistics Division with staff from both Statistics Canada and the Ministry of State for Science and Technology. The basic mission of the Division is to assure the availability of pertinent statistical information in support of the development of science and technology in Canada.

Activities of the Division are described in a semi-annual report distributed free of charge entitled **Activities of the Science and Technology Statistics Division.** This report is published in June and December each year (First issue June 1984).

Information is disseminated in a series of reports including monthly service bulletins, occasional background papers and annual reports which are described below.

Catalogue

88-001	Science Statistics
88-201	Science and Technology Indicators, 1984
88-202	Industrial Research and Development Statistics, 1982
88-203	Resources for Research and Development in Canada, 1982
88-204E	Federal Scientific Acitivies, 1984-85
88-502E	International Payments and Receipts for Technology
88-503E	Technology and Commodity Trade
88-505E	Industrial Productivity and Research and Development Indicators
88-506E	A Framework for Measuring Research and Development Expenditure in Canada
88-507E	An Indicator of Excellence in Canada Science Summary Report

Uncatalogued

Federal Government Expenditures on Activities in the Natural Sciences 1963-64 to 1984-85

Federal Government Expenditures on Activities in the Social Sciences and Humanities 1970-71 to 1984-85

Federal Personnel Engaged in Scientific Activities 1976-77 to 1984-85

Federal Science Expenditures and Personnel 1984-85

Federal Scientif Establishments 1982-83 Gross Domestic Expenditures on R&D, by Region, 1979-82

Calculation of R&D Expenditures in the Higher Education Sector, by Province, 1982

Appendix B - Questionnaires and Guide: Provincial Government Survey

PROVINCIAL GOVERNMENT ACTIVITIES
IN THE
NATURAL SCIENCES

QUESTIONNAIRE AND GUIDE

FISCAL YEAR 1983-84

Ministry/Department or Agency	Reporting Unit	
Coordinator	Mailing Address	Telephone No.
Enquiries to be directed to	Telephone No.	Date

8-2100-120.1: 23-2-84 TB/CT-REG. B101536

INTRODUCTION

This questionnaire covers natural science activities funded by the provincial government. It includes expenditure and personnel data for research and development (R & D) and related scientific activities. All departments and agencies known to be conducting or funding activities in the natural sciences are included.

The classification used in this questionnaire will not necessarily correspond to existing accounting systems or organizational units. Accurate data, therefore, depend on the good will and intelligent judgement of the responding officers. Information is required which describes the characteristics and magnitude of the department's activities; it is not a matter of decimal precision of data.

The data collected provide useful information for the development and analysis of provincial science policy. These statistics are also included with data collected from other sectors to provide national aggregates published by Statistics Canada. Data are released only with the approval of the provincial government.

This questionnaire includes only scientific activities in the natural sciences and technology.

Natural sciences and technology include the following disciplines:

Life sciences — medical and biological
Physical sciences — chemistry, physics and astronomy
Environment sciences — geology, oceanography and the study of the atmosphere
Engineering sciences — architecture, civil engineering, etc.
Mathematical sciences

If departmental scientific activities involve natural science disciplines, complete this questionnaire.

The social sciences and humanities include such disciplines as:

Anthropology
Business administration and commerce
Communications
Criminology
Demography
Economics
Geography
History
Languages, literature and linguistics
Law
Library science
Philosophy
Political science
Psychology
Religious studies
Social work
Sociology
Urban and regional studies

If departmental scientific activities involve these disciplines, complete the separate questionnaire on activities in the social sciences and humanities.

In many instances, particularly in health fields, it will be difficult to distinguish between the natural and the social sciences. In such instances, however, some allocation must be made. Respondents should consider the main orientation of the projects involved and the field of training of the personnel in determining this allocation. Any measure which reflects the actual situation is acceptable.

Scientific Activities

The activities which concern us are those scientific and technological (S & T) activities which involve the generation, dissemination and initial application of new scientific and technological knowledge. The central activity is research and experimental development (R & D). In addition, there are a number of activities closely related to R & D. Included in this survey are: education support, technical surveys, information services, special services and studies, and museum services.

Research and Experimental Development

Research and experimental development (R & D) is defined as creative work undertaken on a systematic basis to increase the stock of scientific and technical knowledge and to use this knowledge in new applications.

The central characteristic of R & D is an appreciable element of novelty and of uncertainty. New knowledge, products or processes are sought. The work is normally performed by, or under the supervision of, persons with post-graduate degrees in the natural sciences or engineering.

R & D is generally carried out by specialized R & D units. However, an R & D project may also involve the use of non-R & D facilities (e.g. testing grounds), the purchase or construction of specialized equipment and materials, and the assistance of other units. Costs of such items, attributable to the project, are to be considered R & D costs.

R & D units may also be engaged in non-R & D activities such as technical advisory services, testing, and construction of special equipment for other units. So far as it is practical, the effort devoted to such operations should be excluded from R & D.

On the other hand, R & D may be carried out by units normally engaged in other functions (e.g. a marine survey ship used for hydrological research, a geological survey team directed to work in a certain area in order to provide data for a geophysical research project). Such effort is part of an R & D project and, again so far as is practical, the costs should be assigned to R & D expenditures.

Examples:

1. The development of new methods of identifying tree species and checking their condition is R & D; the use of recently developed methods, such as remote sensing and infra-red photography, as part of normal forestry surveys, is not.

2. The operation of a new transportation system as a demonstration project is not R & D; however, the *creation* of the system as a *prototype* and the evaluation of its operations should be considered R & D.

3. Grants to provide equipment for an R & D laboratory are to be considered R & D; grants to provide the same equipment primarily for teaching or medical care should not be considered R & D.

Related Scientific Activities

Education support — grants to individuals or institutions intended to support the advanced education of students in technology and the natural sciences. Report grants intended primarily to support the research activities of individuals as R & D (either R & D grants or research fellowships).

Technical surveys — activities directed towards the exploration and systematic description of the earth and its natural resources.

The activities which make up technical surveys include the gathering, processing, collating and analyzing of data on natural phenomena except when part of a research project or a museum service. The preparation of maps and survey reports, their printing and cataloguing, are also included.

Typical technical surveys are regular geological, hydrographic, and topographic surveys; routine astronomic observations; establishment and maintenance of meteorological records; soil, plant, fisheries, and wildlife surveys; routine soil and water tests; and monitoring of radioactivity levels.

Information services — all work directed to recording, classifying, translating, and disseminating scientific and technological information. Included are the operations of scientific and technical libraries, the publication of scientific journals and bibliographies, and the organizing of scientific conferences. Grants for the publication of scholarly works are also included.

General purpose information services or information services directed primarily toward the general public are excluded, as are general departmental and public libraries. When individual budgets exist, the costs of libraries which belong to institutions otherwise entirely classified to another activity, such as R & D or Technical surveys, should be assigned to Information services. S & T advisory and consultancy services for industry and agriculture are part of Information services. The costs of printing and distributing reports from activities such as Technical surveys or R & D are attributable to those activities.

Special services and studies — work directed towards the establishment of national and provincial standards for materials, devices, products and processes; the calibration of secondary standards; non-routine quality testing; feasibility studies and demonstration projects.

Feasibility studies are technical investigations of proposed engineering projects to provide additional information required to reach decisions on implementation. Demonstration projects involve the operation of scaled-up versions of a facility or process, or prototypes, after the R & D is completed, to provide additional data on factors such as costs, operational characteristics, market demand and public acceptance. Projects called "demonstration projects" but which conform to the definition of R & D should be considered R & D. Once a facility or process is operated primarily to provide a service or to gain revenue, rather than as a demonstration, it should no longer be considered in Special services and studies. In all demonstration projects, only the *net* costs should be considered.

Museum services — comprise the collecting, cataloguing, and displaying of specimens of the natural world or of representations of natural phenomena. The scientific activities of natural history museums, zoological and botanical gardens, aquaria, planitaria, and nature reserves are included.

The activity represents a systematic attempt to preserve and display items from the natural world; in some ways it could be considered an extension of information services. Parks which are not primarily restricted reserves for certain fauna or flora are not included. In all cases the costs of providing entertainment and recreation to visitors should be excluded (e.g. restaurants, children's gardens and nurseries).

If practical, resources of such institutions devoted to other activities, such as R & D or Information services, should be excluded from Museum services and assigned to those activities.

When a museum covers not only natural history but also aspects of human cultural activities, the museum's resources should be prorated between the natural and the social sciences. However, museums of science and technology, which display man-made objects and also may illustrate the operation of scientific "laws", should be considered in Museum services in the social sciences and humanities.

A. UNITS OF DEPARTMENT WHICH CARRIED OUT SCIENTIFIC ACTIVITIES (p.vi)

List those units (section/division/branch/station/group) of the department which carry out scientific activities and check the appropriate activities. If most of the units of a larger organization are engaged in the same activity, only the larger unit need be identified.

The list should help you to ensure that all the activities of the department are considered and that smaller units are not overlooked. It will also assist the data users to better understand the nature of the various scientific activities performed and could serve as a starting point for users requiring more information on some aspect of the department's activities.

B. MAJOR PAYMENTS FOR SCIENTIFIC ACTIVITIES (p. vii)

Enter the name and city of each recipient of a major payment (≥$25,000) and enter the payment in the appropriate activity column. Both grants and contracts are included.

The information provided here will assist you to complete Question 1, the "key" question in the survey. It will also be used by Statistics Canada to ensure that major external performers of scientific activities are included in surveys of the other sectors.

Replies to this question will be treated as confidential by both Statistics Canada and the provincial government.

1. PERFORMERS OF SCIENTIFIC ACTIVITIES (p. 1)

Performers

Intramural — the reporting department. The scientific work is normally carried out by personnel assigned to the department and usually in facilities of the department. Also included are the administration of extramural programs, the costs of acquiring land, buildings and equipment to be used in scientific activities, and contracts to provide services required for scientific projects (e.g. rental of aircraft, computer services).

Industry — Canadian business and government enterprises. Include public utilities and government-owned firms as well as non-profit institutions and associations mainly serving industry and not controlled by another institution (e.g. Pulp and Paper Research Institute). Consultants providing scientific and engineering services are also included. Industrial research institutes affiliated with a university belong in the Universities sector.

Universities — Canadian universities and affiliated institutes owned, administered or staffed by them (e.g. Atlantic Industrial Research Institute of Nova Scotia Technical College). Teaching facilities in non-university hospitals are included.

Hospitals and health organizations — Canadian hospitals and health organizations which are not part of university medical schools.

Provincial research organizations — The Nova Scotia Research Council, the New Brunswick Research and Productivity Council, le Centre de recherche industrielle du Québec, the Ontario Research Foundation, the Manitoba Research Council, the Saskatchewan Research Council, the Alberta Research Council, and the Research Council of British Columbia.

Other—the federal government, other provincial government departments, municipal governments, individuals and institutions not identified with any other sector, and foreign performers.

Activities — the activities of R & D, education support, technical surveys, information services, special services and studies, and museum services have been defined above. These activities are further classified by type of expenditure.

Current expenditures — expenditures on items such as personnel, transportation and communications, information, professional and special services, rentals, purchased repair and upkeep, utilities, materials and supplies. Current expenditures for R & D are divided as follows:

> **In-house R & D**— R & D performed by personnel of the reporting department. It may include R & D carried out on behalf of another department and covered by a transfer of funds, as well as services provided by other organizations (e.g. computing, transportation).
>
> **R & D contracts**— payments to other organizations to carry out R & D intended to directly benefit the reporting department. The administration of R & D contracts is an intramural cost.
>
> **R & D grants and contributions**—payments to other organizations (or individuals) for R & D intended basically to benefit the recipient of the grant. Contributions and loans should be considered as grants. The administration of R & D grants and contributions is an intramural cost.
>
> **Research fellowships** — payments to individuals for advanced research training and experience. The aim of the program should be research training rather than education.

Capital expenditures — expenditures on the construction and acquisition of land, buildings, machinery, and equipment.

2. SOURCES OF FUNDS FOR SCIENTIFIC ACTIVITIES (p. 1)

This question identifies the sources of funds for the total expenditures on scientific activities reported in Question 1. It will help to ensure that work funded from outside the department is not overlooked.

From departmental budget — that portion of the total departmental budget which was spent on natural science activities.

From other departments — money transferred from another provincial department to this one for activities in the natural sciences. Include when applicable, provincial portions of any federal-provincial cost sharing programs and identify the program.

From the Federal government — all funds from the federal government used for natural science activities. The funds are referred to as payments, contributions, transfers, etc. Also include federal portions of any federal-provincial cost sharing programs and identify the program.

From trust funds — all funds from trust funds used for natural science activities.

From other sources — all funds for natural science activities from sources not specified above such as reserve funds, revenues from sales or fees.

3. DEPARTMENTAL PERSONNEL ENGAGED IN SCIENTIFIC ACTIVITIES (p. 2)

The categories used to classify personnel will generally correspond to those used by the provincial government. The definitions given below indicate the training and educational level generally required for such categories. In all cases, however, consider the job classification, not the person's qualifications, because there will be some employees who exceed the qualifications required by the job (e.g. a person with a degree in a technical or clerical position).

Scientific and professional — people in jobs that require at least one academic degree or nationally recognized professional qualification (e.g. chartered accountant — C.A.) as well as those with equivalent experience.

Technical — people in jobs that require specialized vocational or technical training beyond the secondary level (e.g. community colleges and technical institutes) as well as those with experience equivalent to this training.

Other — clerical, secretarial, administrative, operational and other support personnel.

Data are requested by activity and category of employment in person-years or full-time equivalent. Persons engaged only in a scientific activity are considered one person-year. Those working part-time only on scientific activities are considered as a fraction corresponding to their involvement. Include both permanent and non-permanent employees.

Care should be taken to ensure that the personnel data reported are consistent with the expenditure data. This is the most common reason for questioning the validity of a return. It is suggested that respondents check this by dividing the reported total person-years into the intramural personnel costs reported in Question 4 to determine if the cost per person is a reasonable figure.

4. DETAIL OF INTRAMURAL EXPENDITURES (p. 2)

These data are useful for intra-departmental comparisons, for construction of constant dollar expenditures series, and for editing the question on personnel.

Some work is considered intramural although it is actually performed outside the department. This is because the performer supplies a service or good, the provision of which it would not consider a scientific activity. Examples are computing services purchased from another government department or the private sector, materials and supplies for the department's scientific activities, rental of accommodation or transportation. All non-capital expenditures of this nature are to be considered "other costs", even if the personnel cost's portion of such purchases are known. "Personnel costs" are to be used only for the departmental personnel reported in the preceding question.

5. OBJECTIVES OF EXPENDITURES ON SCIENTIFIC ACTIVITIES (p. 3)

The objectives listed are not mutually exclusive, nor do they represent the total range of possible objectives. They are, however, intended to cover the major areas of current economic, political and technological interest. This list is common to both the social and natural sciences.

Report expenditures under the objective which is primary to that expenditure. Generally, the objective selected should be consistent with the stated objectives of the reporting department.

Advancement of science — activities for the development of general scientific knowledge (e.g. general R & D grants to universities or support of fields such as astronomy and archaeology).

Communications — activities in support of the development and regulation of communication services, including telecommunications.

Energy and fuels:

Fossil fuels — activities concerned with the exploration, extraction, refining, use and conservation of crude oils, natural gas and coal.

Hydro electric energy — activities directed towards the generation, use and conservation of hydro electric power.

Nuclear energy — activities directed towards the development and use of nuclear energy, including safety and wastes management.

Other (specify) any other activities not covered by those listed above e.g. solar energy, biomass energy etc.

Environmental issues — activities aimed at preserving or restoring environmental quality, including scientific work on pollution but excluding medical aspects. For example, R & D on diseases caused by pollution should be reported under the health objective.

Health — activities related to the maintenance and improvement of the physical well-being of the population.

Industrial and economic development:

Agriculture — activities which support the agricultural industry.

Fisheries — activities which support the fishing industry.

Forestry — activities which support the forestry industry.

Manufacturing — measures intended to achieve efficient and sustained growth in manufacturing industries, and the encouragement of the production of new goods and services.

Minerals — activities related to the location, extraction, processing, use and conservation of mineral resources (except fuels).

Other (specify) — any objectives not covered by those listed above.

Social development and related areas:

Culture, sport and recreation — activities related to the support and development of culture, physical fitness, sport and recreation. Include wilderness recreation and conservation of fauna and flora.

Education — education support, grants for education research, activities in support of education policy.

Human resources — activities directed towards the development and utilization of the labour force. Labour relations, personnel policy and training programs, demographic and immigration studies are included.

Urban and regional studies — studies directed towards understanding communities and improving life within the urban and rural community.

Other (specify) — other activities directed towards social well-being (e.g. administration of justice, consumer protection).

Transportation — activities in support of the development and regulation of transportation services.

Other (specify) — any objectives not covered by those listed above.

NS

Province ______

Ministry/Department ______

A. UNITS OF DEPARTMENT WHICH CARRIED OUT SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page ii)

Unit	R & D	Education support	Technical surveys	Information services	Special services and studies	Museum services
				(✓)		

DESCRIPTION OF INTRAMURAL ACTIVITIES

Briefly describe the intramural scientific activities of the reporting department. Describe major current projects rather than overall programs. Attach any relevant material (papers, annual reports, etc.) which provide descriptions of departmental activities.

NS

Province ____________

Ministry/Department ____________

B. MAJOR PAYMENTS FOR SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page iii)

Recipient	R & D	Education support	Technical surveys	Information services	Special services and studies	Museum services
			$000			

DESCRIPTION OF EXTRAMURAL ACTIVITIES

Briefly describe extramural projects, or programs, and identify the sectors in which they are conducted. If descriptive material or lists of projects are available they may be submitted in lieu of completing this question.

Province ____________________

Ministry/Department ____________________

1. PERFORMERS OF SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page iii)

Scientific activity	1. Intramural activities	Payments to:					7. Total 1983-84
		2. Industry	3. Universities	4. Hospitals & health organizations	5. Provincial research organizations	6. Other	
				$000			
Research and experimental development (R & D):							
Current expenditures:							
1. In-house R & D		▨	▨	▨	▨	▨	
2. R & D contracts							
3. R & D grants and contributions							
4. Research fellowships							
5. **Sub-total** (1 + 2 + 3 + 4)							
6. Capital expenditures		▨	▨	▨	▨	▨	
Related scientific activities (RSA):							
Current expenditures:							
7. Education support							
8. Technical surveys							
9. Information services							
10. Special services and studies							
11. Museum services							
12. Capital expenditures		▨	▨	▨	▨	▨	
13. **TOTAL EXPENDITURES**							

2. SOURCES OF FUNDS FOR SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page iii)

	$000
1. From departmental budget	
2. From other departments	
3. From federal government (specify source)	
4. From trust funds	
5. From other sources (reserve funds, revenues from sales or fees)	
6. **TOTAL EXPENDITURES**	

NS

Province ____________________

Ministry/Department ____________________

3. DEPARTMENTAL PERSONNEL ENGAGED IN SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page iv)

Type of personnel	1. R & D	2. Related scientific activities	3. Total 1983-84
		Person-years	
1. Scientific and professional			
2. Technical			
3. Other			
4. **TOTAL PERSONNEL**			

4. DETAIL OF INTRAMURAL EXPENDITURES, 1983-84 (Instructions — Page iv)

Current expenditures:	$000
1. Total estimated personnel costs	
2. Other costs (e.g. computing services, materials and supplies, rentals)	
3. Sub-total, current expenditures	
Capital expenditures:	
4. Land and buildings	
5. Machinery and equipment	
6. Sub-total, capital expenditures	
7. **TOTAL INTRAMURAL EXPENDITURES**	[1]

[1] Equal to Question 1: column 1, row 13

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Province ____________

Ministry/Department ____________

5. OBJECTIVES OF EXPENDITURES ON SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page iv)

Objective	Intramural		Extramural		TOTAL
	R & D	Related scientific activities	R & D	Related scientific activities	
	$000				
1. Advancement of science					
2. Communications					
Energy and fuels:					
3. Fossil fuels					
4. Hydro electric energy					
5. Nuclear energy					
6. Other (specify)					
7. Environmental issues					
8. Health					
Industrial and economic development:					
9. Agriculture					
10. Fisheries					
11. Forestry					
12. Manufacturing					
13. Minerals					
14. Other (specify)					
Social development and related areas:					
16. Culture, sport and recreation					
17. Education					
18. Human resources					
19. Urban and regional studies					
20. Other (specify)					
21. Transportation					
22. Other (specify)					
23. TOTAL	[1]	[2]	[3]	[4]	

[1] Equal to Question 1: column 1, rows 5 and 6

[2] Equal to Question 1: column 1, rows 7, 8, 9, 10, 11 and 12

[3] Equal to Question 1: columns 2, 3, 4, 5 and 6, row 5

[4] Equal to Question 1: columns 2, 3, 4, 5 and 6, rows 7, 8, 9, 10 and 11

Province ________________

Ministry/Department ________________

6. PERFORMERS OF SCIENTIFIC ACTIVITIES, 1984-85 (ESTIMATES)

Scientific activity	1. Intramural activities	Payments to:					7. Total 1984-85
		2. Industry	3. Universities	4. Hospitals & health organizations	5. Provincial research organization	6. Other	
				$000			
Research and experimental development (R & D):							
Current expenditures:							
1. In-house R & D		▨	▨	▨	▨	▨	
2. R & D contracts							
3. R & D grants and contributions							
4. Research fellowships							
5. **Sub-total** (1 + 2 + 3 + 4)							
6. Capital expenditures		▨	▨	▨	▨	▨	
Related scientific activities (RSA):							
Current expenditures:							
7. Education support							
8. Technical surveys							
9. Information services							
10. Special services and studies							
11. Museum services							
12. Capital expenditures		▨	▨	▨	▨	▨	
13. **TOTAL EXPENDITURES**							

7. DEPARTMENTAL PERSONNEL ENGAGED IN SCIENTIFIC ACTIVITIES, 1984-85 (ESTIMATES)

Type of personnel	1. R & D	2. Related scientific activities	3. Total 1984-85
		Person-years	
1. Scientific and professional			
2. Technical			
3. Other			
4. **TOTAL PERSONNEL**			

PROVINCIAL GOVERNMENT ACTIVITIES
IN THE
SOCIAL SCIENCES AND HUMANITIES

QUESTIONNAIRE AND GUIDE
FISCAL YEAR 1983-84

Ministry/Department or Agency	Reporting Unit	
Coordinator	Mailing Address	Telephone No.
Enquiries to be directed to	Telephone No.	Date

8–2100–121.1: 23-2-84 TB/CT–REG. B101536

INTRODUCTION

This questionnaire covers activities in the social sciences and humanities funded by the provincial government. It includes expenditure and personnel data for research and development (R & D) and related scientific activities. All departments and agencies known to be conducting or funding activities in the social sciences are included.

The classifications used in this questionnaire will not necessarily correspond to existing accounting systems or organizational units. Accurate data, therefore, depend on the good will and intelligent judgement of the responding officers. Information is required which describes the characteristics and magnitude of the department's scientific activities; it is not a matter of decimal precision of data.

The data collected provide useful information for the development and analysis of provincial science policy. These statistics are also included with data collected from other sectors to provide national aggregates published by Statistics Canada. Data are released only with the approval of the provincial government.

This questionnaire includes only scientific activities in the social sciences and humanities.

The social sciences and humanities include such disciplines as:

- Anthropology
- Business administration and Commerce
- Communications
- Criminology
- Demography
- Economics
- Geography
- History
- Languages, literature and linguistics
- Law
- Library science
- Philosophy
- Political science
- Psychology
- Religious studies
- Social work
- Sociology
- Urban and regional studies

If departmental scientific activities involve these disciplines, complete this questionnaire.

Natural sciences and technology include the following disciplines:

Life sciences — medical and biological
Physical sciences — chemistry, physics and astronomy
Environmental sciences — geology, oceanography and the study of the atmosphere
Engineering sciences — architecture, civil engineering, etc.
Mathematical sciences

If departmental scientific activities involve these disciplines, complete the separate questionnaire on the natural sciences and technology.

In many instances, particularly in health fields, it will be difficult to distinguish between the social and natural sciences. In such instances, however, some allocation must be made. Respondents should consider the main orientation of the projects involved and the field of training of the personnel in determining this allocation. Any measure which reflects the actual situation is acceptable.

Scientific Activities

The activities which concern us are those scientific and technological (S & T) activities which involve the generation, dissemination and initial application of new scientific and technological knowledge. The central activity is research and experimental development (R & D). In addition, there are a number of activities closely related to R & D. Included in this survey are: education support, statistical surveys, information services, special services and studies, and museum services.

Research and Experimental Development

Research and experimental development (R & D) is defined as creative work undertaken on a systematic basis towards the acquisition of new knowledge about man, his actions and his institutions, and the application of this knowledge in new ways.

Both "research" and "development" are often used with different meanings in the government. For example, it is increasingly common to hear that someone is researching something, i.e., the person is looking for information about something.

Similarly, there are many units with either research or development or both terms in their titles which are concerned primarily with information gathering, speech writing, preparation of position papers or departmental organization.

R & D requires the acquisition of knowledge and not just information. New knowledge involves the integration of newly acquired information into existing hypotheses, the formulation and testing of new hypotheses or the reevaluation of existing observations.

An R & D project generally has three characteristics:

— a substantial element of uncertainty, novelty and innovation;
— a well-defined project design;
— a report on the procedures and results of the project.

"Many social scientists perform work in which they bring the established methodologies and facts of the social sciences to bear upon a particular problem, but which cannot be classified as research. The following are examples of work which might come in this category and are *not* R & D: interpretative commentary on the probable economic effects of a change in the tax structure, using existing economic data; forecasting future changes in the pattern of the demand for social services within a given area arising from an altered demographic structure; operations research as a contribution to decision-making, e.g. planning the optimal distribution system for a factory; the use of standard techniques in applied psychology to select and classify industrial and military personnel, students, etc., and to test children with reading or other disabilities."
(Frascati Manual)

Related Scientific Activities

Education support — consists of grants to individuals or institutions intended to support the advanced education of students in the social sciences and humanities. Report grants intended to support the research activities of individuals as R & D (either R & D grants or research fellowships).

Statistical surveys — the collecting, processing and disseminating of statistics on man, his economic and social activities. Included are the development of technical methodology and statistical analysis.

The institutions involved are the statistical bureaux of provincial governments and the statistical sections of departments and agencies. If there are units whose principal activity is R & D, their costs and personnel should be assigned to R & D; specialized libraries with separate budgets should be assigned to Information services.

Information services — all work directed to recording, classifying, translating, and disseminating information resulting from R & D in the social sciences or required in support of such R & D. Included are the operations of specialized libraries and archives, the publication of scholarly journals and bibliographies, and the organizing of scientific conferences. Grants for the publication of scholarly works are also included.

General purpose information services or information services directed primarily toward the general public are excluded, as are general departmental and public libraries. When individual budgets exist, the costs of libraries which belong to institutions otherwise entirely classified to another activity, such as R & D or Statistical surveys, would be assigned to information services. The costs of printing and distributing reports from activities such as Statistical surveys or R & D are attributable to those activities.

Special services and studies — systematic investigations carried out in order to provide information needed for planning or policy formulation. Demonstration projects are also included.

The work is usually carried out by specialized units in some government departments, by consultants, by royal commissions, and by task forces. The activity is similar to R & D since it may require innovative analyses and a high degree of scientific ability. However, such studies are not intended to acquire new knowledge but to provide specific answers to specific problems (generally immediate, localized and perhaps temporary). The day-to-day operations of units concerned with departmental planning, organization or management are not normally included but special projects may be relevant.

Examples of special studies would be a study of the viability of a petrochemical complex in a certain region of Canada, the Royal Commission on Poverty, the MacKenzie Valley Pipeline Inquiry, the Science Council's special studies, and the Manitoba Guaranteed Income Experiment (net costs).

Museum services — the collecting, cataloguing, and displaying of specimens and representations relating to the history, social organization, and creations of man.

The activity represents a systematic attempt to preserve and display the works of man and to provide information on his works, history, and nature. The scientific activities of historical museums, archaeological displays, and art galleries are included. In all cases, the costs of providing entertainment and recreation to visitors should be excluded (e.g. restaurants, children's gardens, and nurseries).

If practical, resources of such institutions devoted to other activities, such as R & D or Information services, should be excluded from Museum services and assigned to those activities.

When a museum also covers aspects of natural history, the museum's operations should be divided between the social and natural sciences. However, museums of science and technology, war, etc., which display man-made objects and may also illustrate the operations of certain technologies, should be considered as Museum services in the social sciences and humanities.

A. UNITS OF DEPARTMENT WHICH CARRIED OUT SCIENTIFIC ACTIVITIES (p. v)

List those units (section/division/branch/station/group) of the department which carry out scientific activities and check the appropriate activities. If most of the units of a larger organization are engaged in the same activity, only the larger unit need be identified.

The list should help you to ensure that all the activities of the department are considered and that smaller units are not overlooked. It will also assist the data users to better understand the nature of the various scientific activities performed and could serve as a starting point for users requiring more information on some aspect of the department's activities.

B. MAJOR PAYMENTS FOR SCIENTIFIC ACTIVITIES (p. vi)

Enter the name and city of each recipient of a major payment (>$25,000) and enter the payment in the appropriate activity column. Both grants and contracts are included.

The information provided here will assist you to complete Question 1, the "key" question in the survey. It will also be used by Statistics Canada to ensure that major external performers of scientific activities are included in surveys of the other sectors.

Replies to this question will be treated as confidential by both Statistics Canada and the provincial government.

1. PERFORMERS OF SCIENTIFIC ACTIVITIES (p. 1)

Performers

Intramural — the reporting department. The scientific work is normally carried out by personnel assigned to the department and usually in facilities of the department. Also included are the administration of extramural programs, the costs of acquiring land, buildings and equipment to be used in scientific activities, and contracts to provide services required for scientific projects (e.g. rental of aircraft, computer services).

Industry — Canadian business and government enterprises. Include public utilities and government-owned firms as well as non-profit institutions and associations mainly serving industry and not controlled by another institution (e.g. Pulp & Paper Research Institute). Consultants providing scientific and engineering services are also included. Industrial research institutes affiliated with a university belong in the Universities sector.

Universities — Canadian universities and affiliated institutes owned, administered or staffed by them (e.g. Atlantic Industrial Research Institute of Nova Scotia Technical College). Teaching facilities in non-university hospitals are included.

Hospitals and health organizations — Canadian hospitals and health organizations which are not part of university medical schools.

Provincial research organizations — The Nova Scotia Research Council, the New Brunswick Research and Productivity Council, le Centre de recherche industrielle du Québec, the Ontario Research Foundation, the Manitoba Research Council, the Saskatchewan Research Council, the Alberta Research Council, and the Research Council of British Columbia.

Other— the federal government, other provincial government departments, municipal governments, individuals and institutions not identified with any other sector, and foreign performers.

Activities — The activities of R & D, education support, statistical surveys, information services, special services and studies, and museum services have been defined above. These activities are further classified by type of expenditure.

Current expenditure — expenditures on items such as personnel, transportation and communications, information, professional and special services, rentals, purchased repair and upkeep, utilities, materials and supplies. Current expenditures for R & D are divided as follows:

In-house R & D— R & D performed by personnel of the reporting department. It may include R & D carried out on behalf of another department and covered by a transfer of funds, as well as services provided by other organizations (e.g. computing, transportation).

R & D contracts— payments to other organizations to carry out R & D intended to directly benefit the reporting department. The administration of R & D contracts is an intramural cost.

R & D grants and contributions –payments to other organizations (or individuals) for R & D intended basically to benefit the recipient of the grant. Contributions and loans should be considered as grants. The administration of R & D grants and contributions is an intramural cost.

Research fellowships — payments to individuals for advanced research training and experience. The aim of the program should be research training rather than education.

Capital expenditures — expenditures on the construction and acquisition of land, buildings, machinery, and equipment.

2. SOURCES OF FUNDS FOR SCIENTIFIC ACTIVITIES (p. 1)

This question identifies the sources of funds for the total expenditures on scientific activities reported in Question 1. It will help to ensure that work funded from outside the department is not overlooked.

From departmental budget — that portion of the total departmental budget which was spent on social science activities.

From other departments — money transferred from another provincial department to this one for activities in the social sciences. Include when applicable, provincial portions of any federal-provincial cost sharing programs and identify the program.

From the Federal government — all funds from the federal government used for social science activities. The funds are referred to as payments, contributions, transfers, etc. Also include federal portions of any federal-provincial cost sharing programs and identify the program.

From trust funds — all funds from trust funds used for social science activities.

From other sources — all funds for social science activities from sources not specified above such as reserve funds, revenues from sales or fees.

3. DEPARTMENTAL PERSONNEL ENGAGED IN SCIENTIFIC ACTIVITIES (p. 2)

The categories used to classify personnel will generally correspond to those used by the provincial government. The definitions given below indicate the training and educational level generally required for such categories. In all cases, however, consider the job classification, not the person's qualifications, because there will be some employees who exceed the qualifications required by the job (e.g. a person with a degree in a technical or clerical position).

Scientific and professional — people in jobs that require at least one academic degree or nationally recognized professional qualification (e.g. chartered accountant — C.A.) as well as those with equivalent experience.

Technical — people in jobs that require specialized vocational or technical training beyond the secondary level (e.g. community colleges and technical institutes) as well as those with experience equivalent to this training.

Other — clerical, secretarial, administrative, operational and other support personnel.

Data are requested by activity and category of employment in person-years or full-time equivalent. Persons engaged only in a scientific activity are considered one person-year. Those working only part-time on scientific activities are considered as a fraction corresponding to their involvement. Include both permanent and non-permanent employees.

Care should be taken to ensure that the personnel data reported are consistent with the expenditure data. This is the most common reason for questioning the validity of a return. It is suggested that respondents check this by dividing the reported total person-years into the intramural personnel costs reported in Question 4 to determine if the cost per person is a reasonable figure.

4. DETAIL OF INTRAMURAL EXPENDITURES (p. 2)

These data are useful for inter-departmental comparisons, for construction of constant dollar expenditures series, and for editing the question on personnel.

Some work is considered intramural although it is actually performed outside the department. This is because the performer supplies a service or good, the provision of which it would not consider a scientific activity. Examples are computing services purchased from another government department or the private sector, materials and supplies for the department's scientific activities, rental of accommodation or transportation. All non-capital expenditures of this nature are to be considered "other costs", even if the personnel costs portion of such purchases are known. "Personnel costs" are to be used only for the departmental personnel reported in the previous question.

5. OBJECTIVES OF EXPENDITURES ON SCIENTIFIC ACTIVITIES (p. 3)

The objectives listed are not mutually exclusive, nor do they represent the total range of possible objectives. They are, however, intended to cover the major areas of current economic, political and technological interest. This list is common to both the social and natural sciences.

Report expenditures under the objective which is primary to that expenditure. Generally, the objective selected should be consistent with the stated objectives of the reporting department.

Advancement of science — activities for the development of general scientific knowledge (e.g. general R & D grants to universities or support of fields such as astronomy and archaeology).

Communications — activities in support of the development and regulation of communication services, including telecommunications.

Energy and fuels:

Fossil fuels — activities concerned with the exploration, extraction, refining, use and conservation of crude oils, natural gas and coal.

Hydro electric energy — activities directed towards the generation, use and conservation of hydro electric power.

Nuclear energy — activities directed towards the development and use of nuclear energy, including safety and wastes management.

Other (specify) any other actvities not covered by those listed above e.g. solar energy, biomass energy etc.

Environmental issues — activities aimed at preserving or restoring environmental quality, including scientific work on pollution but excluding medical aspects. For example, R & D on diseases caused by pollution should be reported under the health objective.

Health — activities related to the maintenance and improvement of the physical well-being of the population.

Industrial and economic development:

Agriculture — activities which support the agricultural industry.

Fisheries — activities which support the fishing industry.

Forestry — activities which support the forestry industry.

Manufacturing — measures intended to achieve efficient and sustained growth in manufacturing industries, and the encouragement of the production of new goods and services.

Minerals — activities related to the location, extraction, processing, use and conservation of mineral resources (except fuels).

Other (specify) — any objectives not covered by those listed above.

Social development and related areas:

Culture, sport and recreation — activities related to the support and development of culture, physical fitness, sport and recreation. Include wilderness recreation and conservation of fauna and flora.

Education — education support, grants for education research, activities in support of education policy.

Human resources — activities directed towards the development and utilization of the labour force. Labour relations, personnel policy and training programs, demographic and immigration studies are included.

Urban and regional studies — studies directed towards understanding communities and improving life within the urban and rural community.

Other (specify) - other activities directed towards social well-being (e.g.) administration of justice consumer protection).

Transportation — activities in support of the development and regulation of transportation services.

Other (specify) — any objectives not covered by those listed above.

Province ____________
Ministry/Department ____________

A. UNITS OF DEPARTMENT WHICH CARRIED OUT SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page II)

Unit	Research and experimental development	Related scientific activities
	(✓)	

DESCRIPTION OF INTRAMURAL ACTIVITIES

Briefly describe the intramural scientific activities of the reporting department. Describe major current projects rather than overall programs. Attach any relevant material (papers, annual reports, etc.) which provide description of departmental activities.

Province ____________

Ministry/Department ____________

B. MAJOR PAYMENTS FOR SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page ii)

Recipient	Research and experimental development	Related scientific activities
	$000	

DESCRIPTION OF EXTRAMURAL ACTIVITIES

Briefly describe extramural projects, or programs, and identify the sectors in which they are conducted. If descriptive material or lists of projects are available they may be submitted in lieu of completing this question.

Province ____________________

Ministry/Department ____________________

1. PERFORMERS OF SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page ii)

Scientific activity	1. Intramural activities	Payments to:					7. Total 1983-84
		2. Industry	3. Universities	4. Hospitals & health organizations	5. Provincial research organizations	6. Other	
				$000			
Research and experimental development (R & D):							
Current expenditures:							
1. In-house R & D		▨	▨	▨	▨	▨	
2. R & D contracts							
3. R & D grants and contributions							
4. Research fellowships							
5. **Sub-total** (1 + 2 + 3 + 4)							
6. Capital expenditures		▨	▨	▨	▨	▨	
Related scientific activities (RSA):							
7. Current expenditures							
8. Capital expenditures		▨	▨	▨	▨	▨	
9. **TOTAL EXPENDITURES**							

2. SOURCES OF FUNDS FOR SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page iii)

	$000
1. From departmental budget	
2. From other departments	
3. From federal government (specify source)	
4. From trust funds	
5. From other sources (reserve funds, revenues from sales or fees)	
6. **TOTAL EXPENDITURES**	

Province ____________________

Ministry/Department ____________________

3. DEPARTMENTAL PERSONNEL ENGAGED IN SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page iii)

Type of personnel	1. R & D	2. Related scientific activities	3. Total 1983-84
		Person-years	
1. Scientific and professional			
2. Technical			
3. Other			
4. TOTAL PERSONNEL			

4. DETAIL OF INTRAMURAL EXPENDITURES, 1983-84 (Instructions — Page iv)

Current expenditures:	$000
1. Total estimated personnel costs	
2. Other costs (e.g. computing services, materials and supplies, rentals)	
3. Sub-total, current expenditures	
Capital expenditures:	
4. Land and buildings	
5. Machinery and equipment	
6. Sub-total, capital expenditures	
7. TOTAL INTRAMURAL EXPENDITURES	

'Equal to Question 1: column 1, row 9

Province ____________________

Ministry/Department ____________________

5. OBJECTIVES OF EXPENDITURES ON SCIENTIFIC ACTIVITIES, 1983-84 (Instructions — Page iv)

Objective	Intramural		Extramural		TOTAL
	R & D	Related scientific activities	R & D	Related scientific activities	
	$000				
1. Advancement of science					
2. Communications					
Energy and fuels:					
3. Fossil fuels					
4. Hydro electric energy					
5. Nuclear energy					
6. Other (specify)					
7. Environmental issues					
8. Health					
Industrial and economic development:					
9. Agriculture					
10. Fisheries					
11. Forestry					
12. Manufacturing					
13. Minerals					
14. Other (specify)					
Social development and related areas:					
16. Culture, sport and recreation					
17. Education					
18. Human resources					
19. Urban and regional studies					
20. Other (specify)					
21. Transportation					
22. Other (specify)					
23. **TOTAL**	[1]	[2]	[3]	[4]	

[1] Equal to Question 1: column 1, rows 5 and 6
[2] Equal to Question 1: column 1, rows 7 and 8
[3] Equal to Question 1: columns 2, 3, 4, 5 and 6, row 5
[4] Equal to Question 1: columns 2, 3, 4, 5 and 6, row 7

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Province ____________________

Ministry/Department ____________________

6. PERFORMERS OF SCIENTIFIC ACTIVITIES, 1984-85 (ESTIMATES)

Scientific activity	1. Intramural activities	Payments to:					7. Total 1984-85
		2. Industry	3. Universities	4. Hospitals & health organizations	5. Provincial research organizations	6. Other	
				$000			
Research and experimental development (R & D):							
Current expenditures:							
1. In-house R & D							
2. R & D contracts							
3. R & D grants and contributions							
4. Research fellowships							
5. **Sub-total** (1 + 2 + 3 + 4)							
6. Capital expenditures							
Related scientific activities (RSA):							
7. Current expenditures							
8. Capital expenditures							
9. **TOTAL EXPENDITURES**							

7. DEPARTMENTAL PERSONNEL ENGAGED IN SCIENTIFIC ACTIVITIES, 1984-85 (ESTIMATES)

Type of personnel	1. R & D	2. Related scientific activities	3. Total 1984-85
		Person-years	
1. Scientific and professional			
2. Technical			
3. Other			
4. **TOTAL PERSONNEL**			

Appendix C - Methodology Used In Producing Estimates for the University Sector

1. Expenditure Estimates

Data on research expenditures in the public and private sectors used in this report were compiled through annual surveys. There is, however, no such survey of research expenditures by universities in Alberta. As a result, the procedure for estimating these figures developed by the Canadian Association of University Business Officers (CAUBO) has been adopted for this purpose. The methodology is documented in detail in the Report of the Study on the Costs of University Research, August, 1982.

Universities are typically engaged in two types of research activity:

> Sponsored Research is research activity for which financial support is derived from sources external to the university. This includes funds transferred from trusts and endowments for research purposes, contracts, or grants in aid of research, but does not include research sponsored directly by the university.
>
> Non-Sponsored Research is research activity which is initiated and funded solely from within the university.

The university contributes in various ways toward the support of both types of research. This is done through allocations made from its operating funds, derived primarily from governmental sources, tuition fees and donations. These allocations support not only all costs associated with non-sponsored research, but also such indirect costs associated with sponsored research as professional salaries and support services such as libraries, computers, administration, consumable supplies and physical plant.

Therefore, in terms used in this report, Alberta's universities, through their operating funds, support all costs associated with non-sponsored research, both direct and indirect, and the indirect costs of sponsored research. Other sectors (the Federal Government, industry and the Alberta Government, through contracts and non-operating research grants) are the source of funds for all direct costs of sponsored research performed at Alberta's universities. The total dollar value of all research performed by Alberta's universities is, then, the sum of all the direct and indirect costs of both sponsored and non-sponsored research.

1.1 Derivation of Research Expenditures

Based on the CAUBO methodology, research expenditures are calculated from the total operating expenditures of each university. Total operating expenditures are all expenditures made by the university including those from the general operating fund, trust and endowment funds, and sponsored research allocations, but excluding those from the capital account.

These expenditures have been broken down by faculty with general costs of the university being distributed across each faculty according to its proportion of total faculty expenditure. Faculties are classified according to the Statistics Canada classification of education disciplines. These "discipline groups" are:

1) Education, including Physical Education
2) Humanities, Fine Arts and Social Sciences
3) Business, Administration and Law
4) Physical and Applied Sciences

Multipliers have been derived from the CAUBO study which express, for each discipline group, total research expenditures as a proportion of total operating expenditures. These proportions are reported in Table 1.

When these proportions are applied to values given for sponsored research, trusts and endowments and operating expenditures as reported in the annual financial statements for each university, the form of the relationship becomes:

$$TR = TE(M_1)$$

where:

TR = Total Research Expenditures.

TE = Total Operating Expenditures as reported, including sponsored research, and trusts and endowments.

M_1 = Proportion of TE attributable to research.

The formula is applied to each of the four discipline groups, and the figures are summed to obtain an estimate of total research expenditures by the institution.

2. Personnel Estimates

It is also necessary to estimate the amount of personnel time devoted to research and development. This calculation is based on Full-Time Equivalent data for both full-time and part-time academic staff in teaching faculties at Alberta's universities. It is assumed that the nature of the faculty determines to some extent the proportion of time available for research activity. For this reason the CAUBO methodology also forms the basis for estimates of person-years for research and development.

CAUBO recognizes faculty time can be apportioned to at least three activities: instruction, research, and community and professional service. CAUBO's "Empirical Faculty Activities Analysis" shows research time for all disciplines averages 26 percent. More recent discussion by CAUBO and others suggests that this multiplier may be unrealistically low. Until a better methodology can be devised, it is believed that the average of 36 percent for research time (as employed in previous reports), is a more suitable multiplier for estimating person-years devoted to research and development.

TABLE 1

Multipliers Used in the Derivation of University Research Expenditures by Discipline Group

Discipline Group	Total Research Expenditures as a Percentage of Total Operating Expenditures (M_1)
Education	17
Humanities and Social Sciences	33
Business Administration and Law	25
Physical and Applied Sciences	45
Total Combined	**36**